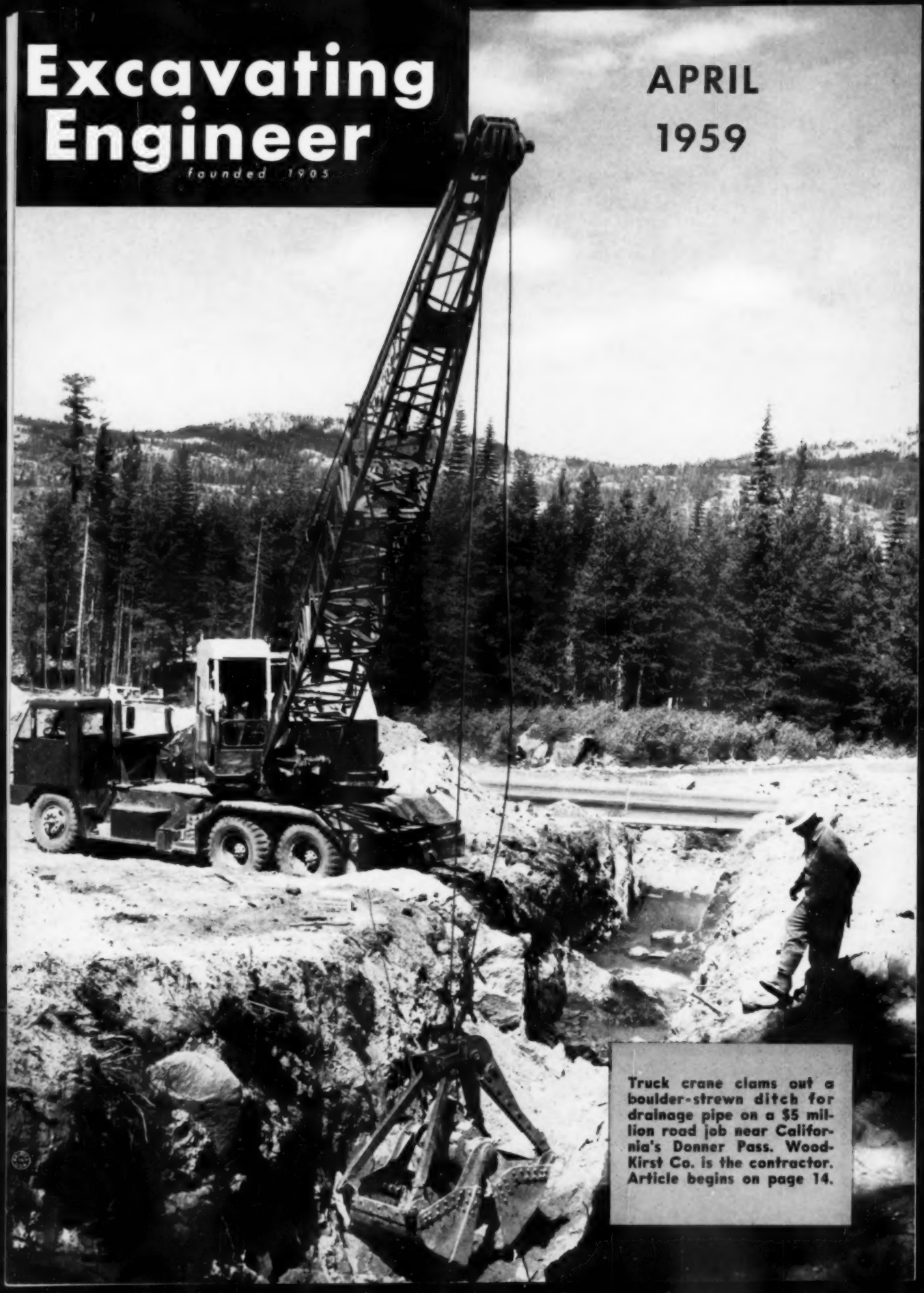
Excavating Engineer

founded 1905

APRIL

1959



Truck crane clams out a boulder-strewn ditch for drainage pipe on a $5 million road job near California's Donner Pass. Wood-Kirst Co. is the contractor. Article begins on page 14.

"Spotty, as a digger, you just ain't got it!"

Without realizing it, Billy has hit upon a basic truth in the excavating business. To come out on top, you've got to use the best equipment for the job.

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Excavating Engineer

founded 1905

South Milwaukee, Wisconsin

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Travel a total of 20,000 miles a day!

Construction of the 12.6 mile causeway across Great Salt Lake in Utah for the Southern Pacific Railroad is one of the most unusual projects in earthmoving history. An estimated total of 36 million yds. of rock, sand and gravel is being placed in a foundation trench dug into the lake bottom to provide stability for the fill. Morrison-Knudsen Co., Inc. is using barges, trucks and rail cars on a 'round the clock, seven days a week schedule and has placed as much as 2,400,000 yds. on the fill in a single month.

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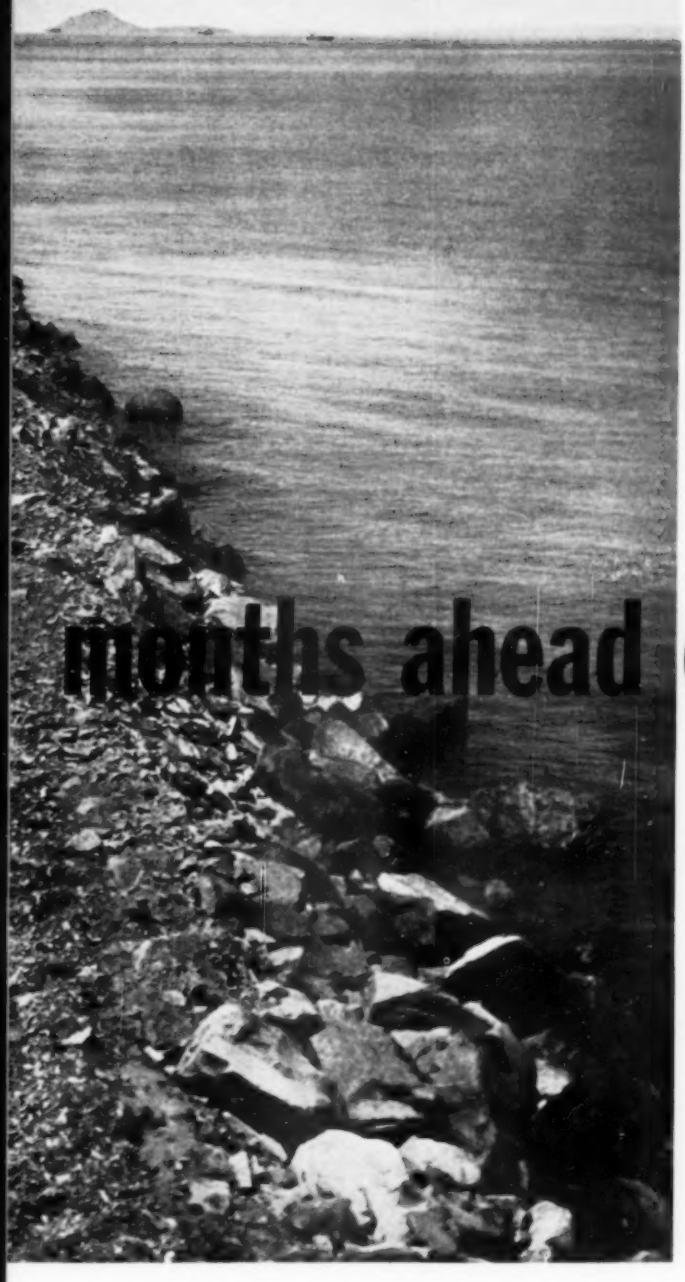

Loaded by 8 yd. shovels, the Bottom-Dump fleet hauls 30 yd. loads to drive-over hoppers at the start of a two mile conveyor system that loads the big barges.

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Finished causeway will project 17 feet above the lake surface—"Eucs" top out the fill after barges have raised it above water.

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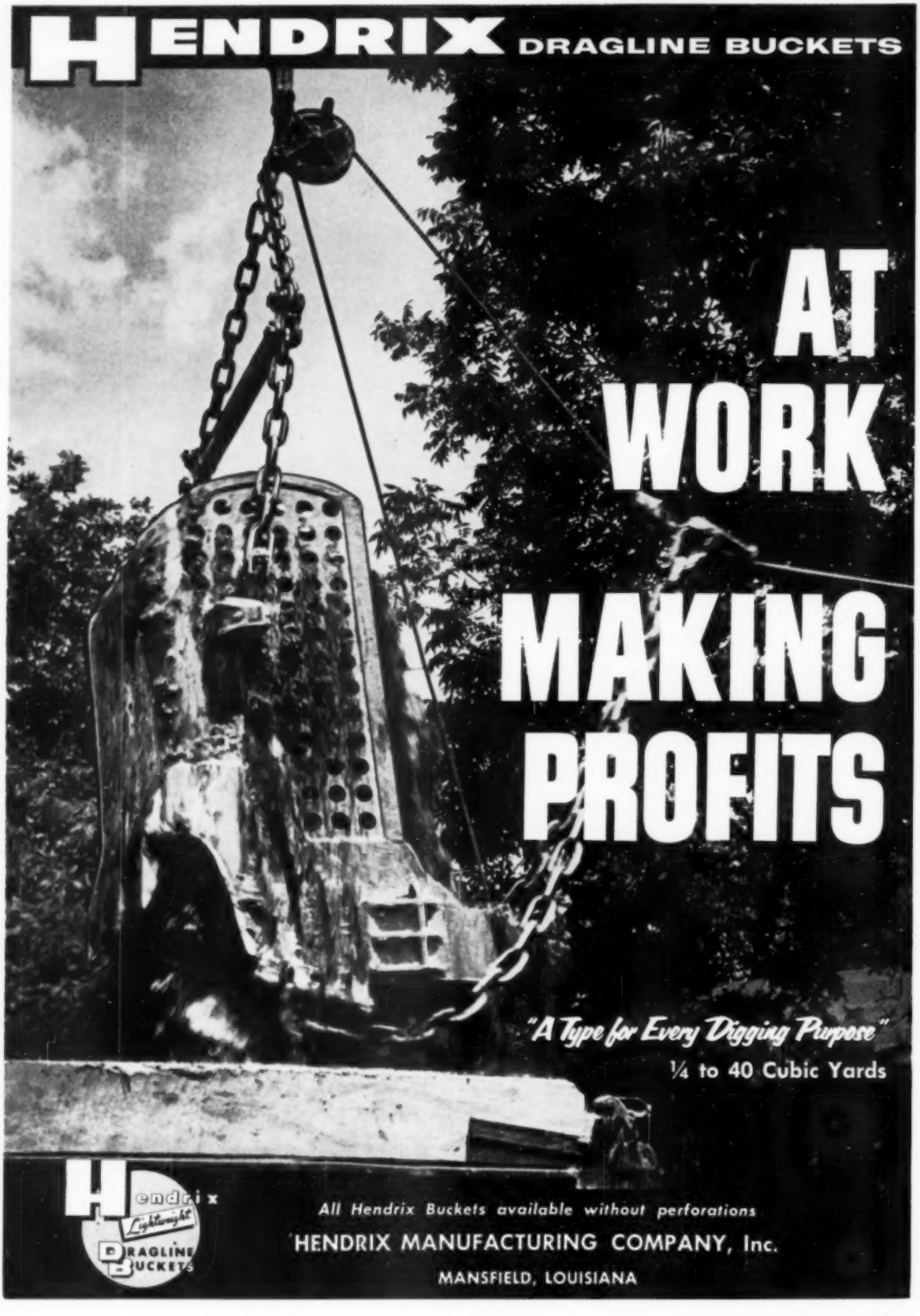

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The advertiser can thus tell whether he's getting his money's worth.

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PROJECT PAYDIRT pays off again...*

NEW CAT D7 SERIES D

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Along with the new features, the best of the time-tested features of the Series C model have been retained. One of many examples: the exclusive Caterpillar oil clutch, which delivers up to 2,000 hours —one whole season—without adjustment!

For complete facts about the leader in this class, see your Caterpillar Dealer. He's ready to give you the whole story about the new D7 Series D, as well as other achievements of Project Paydirt. He'll be glad to demonstrate, too, for this D7 really shines—in action. Say when and where—he'll be there!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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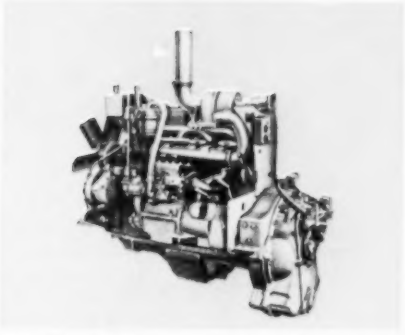
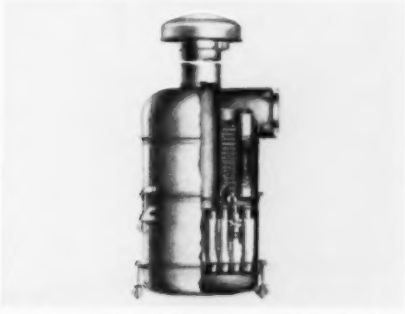
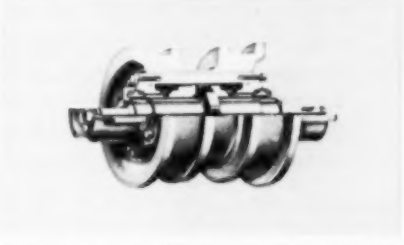


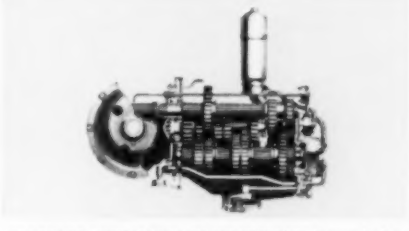
NEW TURBOCHARGED ENGINE. 140 flywheel horsepower . . . 112 drawbar horsepower make the new D7 even more productive. In-seat starting is available as an attachment. And in addition to the 9% horsepower increase, the new Turbocharged Cat Engine offers 80% more tractor lugging ability. The payoff: greater capacity to lug against big loads without stalling—for higher production, greater operating economy.



NEW DRY-TYPE AIR CLEANER. Pioneered by Caterpillar, this new dry-type air cleaner uses cyclone tubes and cellulose filter element to remove at least 99.8% of all dirt and dust from engine intake air—during every operating hour, even under the most severe operating conditions. Filter element can be cleaned and re-used. Cleaner can be serviced in 5 minutes. The payoff: longer engine life, greater economy, less maintenance.



SERVICE-FREE TRACK ROLLERS. New lifetime lubricated track rollers, carrier rollers and idlers on the undercarriage are protected by exclusive Caterpillar floating-ring seals. They need no lubrication until rebuilding, eliminate on-the-job roller lubrication. In addition, track roller life is increased by improved load-carrying design. The payoff: greater economy, longer life, less maintenance.



PRESSURE-LUBRICATED TRANSMISSION. Transmission, bevel gear and pinion are now pressure lubricated with full-flow filtered oil, another development of Caterpillar's research program Project Paydirt. And new power train components, provided to transmit greater horsepower, feature a major increase in strength in the final drive gears. The payoff: longer lived gears and bearings for trouble-free operation.

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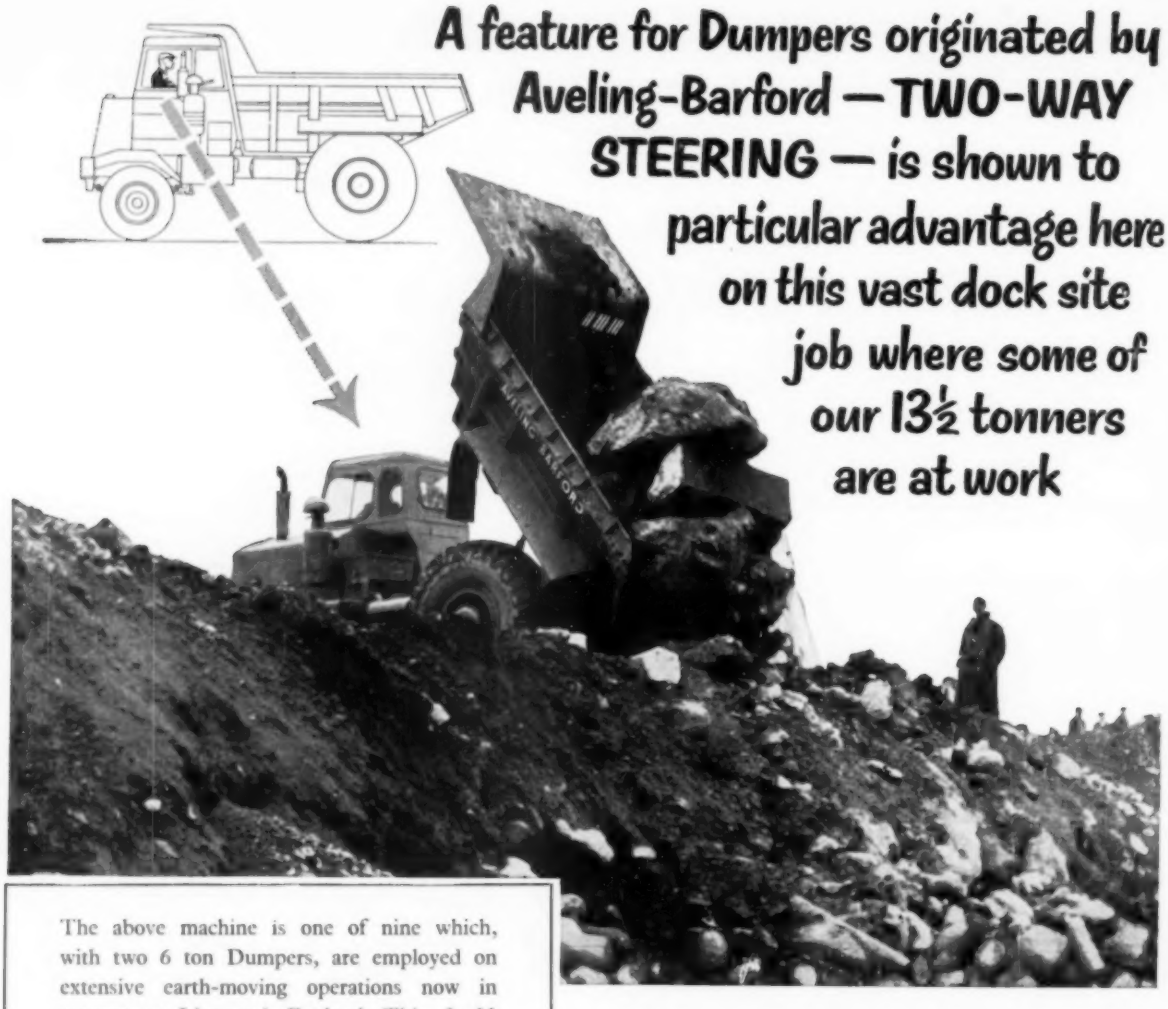

The above machine is one of nine which, with two 6 ton Dumpers, are employed on extensive earth-moving operations now in progress at Liverpool, England. This £17M Langton-Canada Improvement Scheme will provide new deepwater lock entrances and basins for the world's largest ships.

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It's another OUTSTANDING B-E drill with the same rugged stamina . . . the same operating ease and servicing convenience that have made larger Bucyrus-Erie rotaries the most popular in the field — *by far*. The 30-R may also be truck-mounted.

Write Dept. 2B59B, Bucyrus-Erie Company, Drill Division, Richmond, Indiana, for complete information on the new 30-R.

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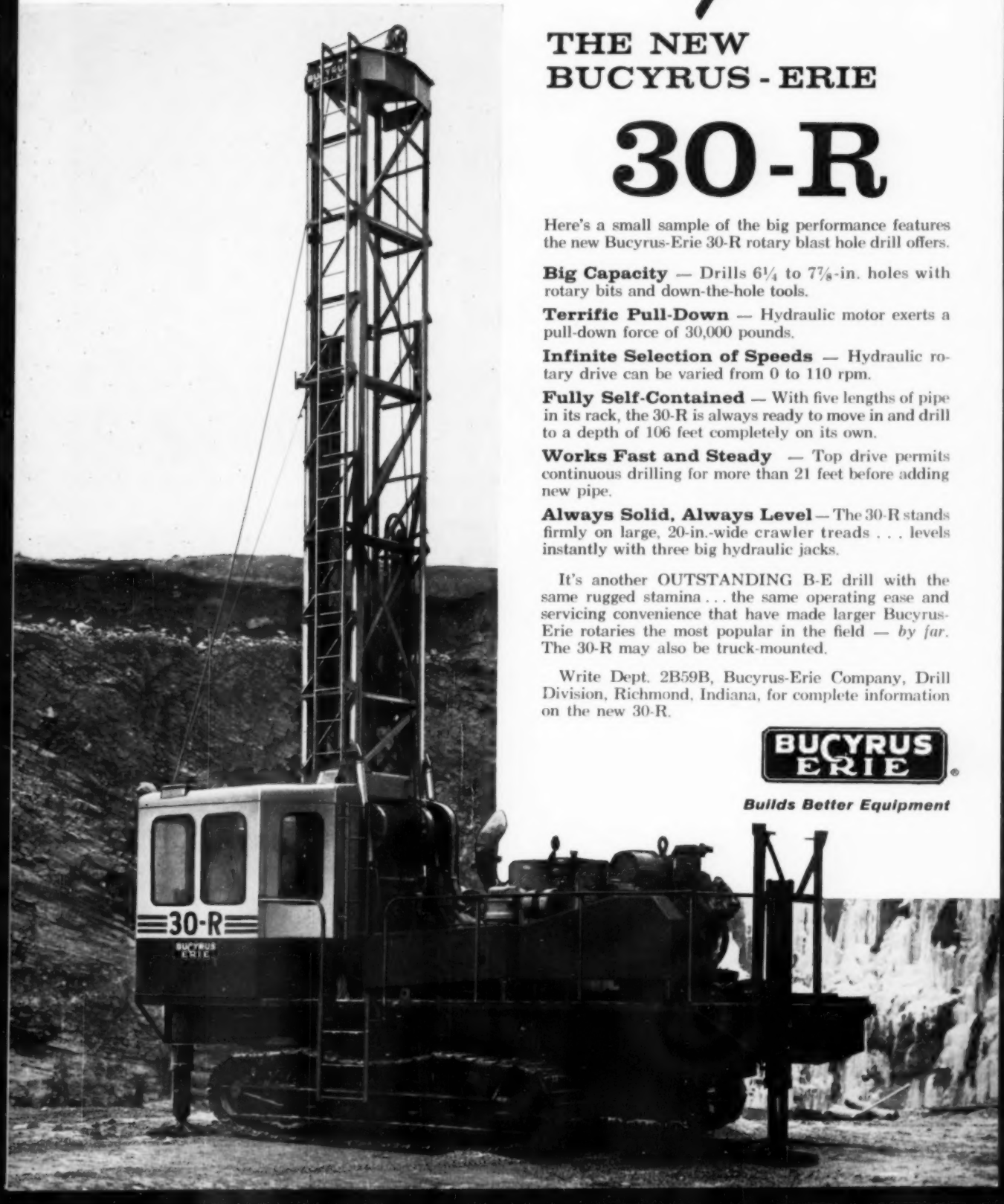

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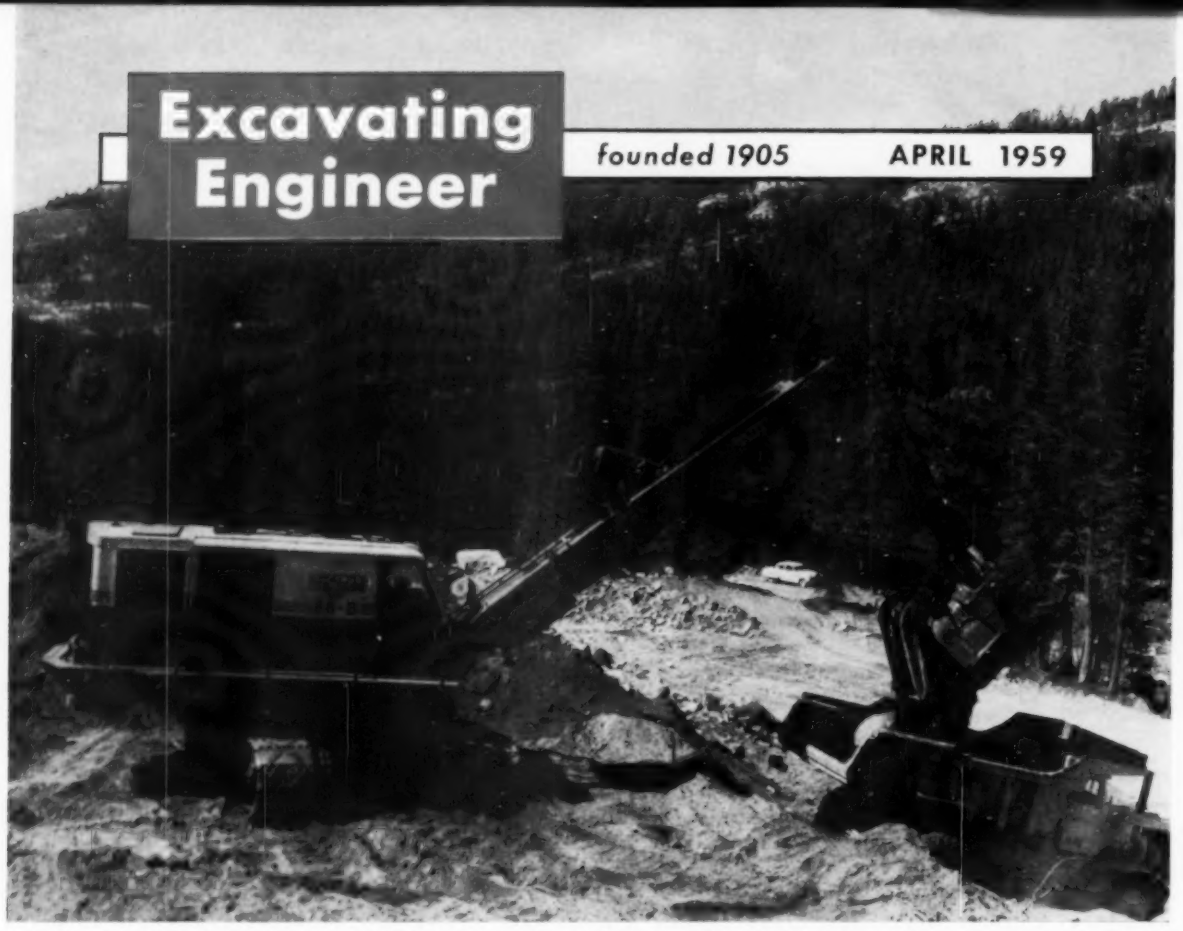

A 4-yd. shovel strips boulder-strewn earth from new rock cut. Such machines are becoming common on western road jobs.

Big Equipment Builds Mountain Superhighway

by Ray Day

ROAD jobs are deceptive. On many jobs, scrapers are all a contractor needs. On others, light ripping will do.

Ever so often a real rock job comes up. On these, nothing but the best drilling equipment and power shovels will do. Even then, tungsten-carbide bits can burn up in 20 feet, and a power shovel can battle every foot of the way fighting oversize boulders, tight bank toes and tough break-out problems.

Exactly that kind of road project is being done three miles down from Donner Pass in some of California's toughest road-building country. The elevation is high—6,000 to 7,000 feet above sea level. Ground formations are either the hardest kind of blue granite, waterlogged shale or plain marshy bogs, for this is High Sierra mountain country. The six-mile section gets California's heaviest winter snowfall, and that is one of the contractor's principal problems.

Joint Venture

Wood-Kirst Co. is the contractor. The $5 million contract is a joint venture, composed of Clyde W. Wood & Sons, Inc., North Hollywood, Calif., and Kirst Construction Co., Inc., Pasadena. The job attracted nine bidders. Wood-Kirst was low by $300,000.

The project is a portion of the east-west transcontinental routing of present U. S. 40 leading across the nation. To design the road right and place it where it belonged, California Division of Highways engineers used aerial photographic methods of location, tying the route down with ground surveys. Then, to make sure that the design would accommodate really modern traffic movement, the highway was split into east-

Wood-Kirst Co. teams up large shovels to push four-lane divided road through rock cuts of blue granite. Twin roadways are spread far apart by median strip up to 190 feet wide.

Quartet of Gardner-Denver Air Tracs drills 2¾-in. holes. Hard rock burns sharp edges off tungsten carbide bits in 20 feet.

bound and westbound lanes, with a maximum grade of 4% on the eastbound upgrade lane and a maximum of 5% on the westbound downhill lane. Curves are easy, gradual. The sharpest is on a 1,500-ft. radius.

The main feature which has caused Wood-Kirst its big trouble all the way along is the fact that the two roadways are benched out at separate locations on the mountainside. The two lanes are never closer than 124 feet apart between their center lines, and they range as far apart in distance as 215 feet. In many places, the wide dividing median leaves the trees remaining in place. And despite the fact that 700,000 cubic yards of the 1,200,000-yd. excavation item is in solid rock—much of it in solid blue granite—the cut slopes are 2 on 1. Flattening of these slopes and allowing a wide dividing median will furnish an excellent place for snow to be thrown, but these plans make the job tough for Wood-Kirst's crews.

Numerous Cuts

Why? Because in general the cuts are not as deep as they usually are in mountain roadbuilding, and the fills are relatively shallow. Fills generally are from 8 to 18 feet deep; the deepest cut is only 50 feet deep. When real excavation production gets under way, as it must to make money, it's hard to find a place for the material in shallow fills. As Frank Wood, one of the contract partners, explained, "You move 8,000 to 10,000 cubic yards a day and you soon find out that the muck spreads out over a lot of ground."

The problem has been further accentuated by the difficulty of clearing far enough ahead of the excavating fleet, and by the fact that many large boulders are present which are difficult to incorporate in a shallow fill. A great deal of material selection has been necessary as a result of all this.

When the Wood-Kirst bid was opened and was apparently low by a considerable margin, Frank Wood and Jim Kirst, the two contractor executives who would be responsible for the work, decided on a rather bold move. Realizing that the importance of getting the clearing out ahead couldn't be overemphasized, the two men didn't wait for the contract to be awarded. Instead, they promptly applied for and got permission to start the clearing even before the contract was formally let. Contract completion time was based on 220 working days but, even so, those working days couldn't be used to best advantage unless clearing was done well ahead of the excavation crews.

A crew of men, several Caterpillar tractors and nine Homelite chain saws were brought in only a few days after the bids were opened. They began to cut the pine and fir trees dotting the hillside, to remove the stumps, and stack and burn the brush. The chain saw and

This rock cut, where a 2½-yd. Northwest 80-D loads Euclids shows the High Sierra's blue granite. Much of the 700,000 yards of rock excavation is in this tough material.

Blount grinder and bit dresser, which is skid-mounted in a small shack close to the drilling spread, is operated by a workman who resharpens all dull bits turned in daily.

tractor gang stayed consistently at work, sometimes on a six-day-a-week basis, but it was always hard pressed by equipment spreads busy with excavation.

The outcropping blue and gray granite which sticks out from the mountainside in many places represents some of the toughest drilling which the two construction firms ever have come up against. It was so tough that the finest tungsten-carbide insert bits burned off a sharpening in 20 feet or less. And in this hard rock progress was slow, with drill rigs dropping down to about 50% of their normal 40-ft. per hour production potential.

The job was geared up for high explosives work, because there was no question that a high percentage of the excavation block required drilling and shooting. To get plenty of high-altitude air compressor capacity on the job, five new 900-cfm Gardner-Denver rotary compressors were purchased along with three 600 rotaries and one 365. In many places these machines are operated in banks, discharging through common receivers and header lines. There are also two small 125-cfm LeRoi Tractairs on the job for miscellaneous pioneer drilling and local plugging.

The drilling fleet consists of seven Gardner-Denver Air Trac mounted down-hole drills equipped with Gardner-Denver DH-123 guns. There are also four sets of Gardner-Denver dual DH-99's mounted on Hydrabooms. The tractor mounting of these machines permits them to get into fairly inaccessible places and to do drilling up to 20 feet deep in a hurry. Gardner-Denver Series 600 sectional steel is being used on all machines, with 20-ft. maximum length normally used on the Hydrabooms, and up to four 10-ft. pieces used on the Air Tracs. Both Timken and Brunner & Lay rock bits are being used, bottoming the holes at 2¼ to 3-in. diameter. The average hole pattern is 6 x 6-ft. square, or 5 x 7-ft. staggered.

Hardness of much of the granite has played havoc with drill bits. The drilling policy, however, is always to drill with sharp bits, because that's the way to get the best production with tungsten-carbide inserts. The contractors bought a Blount grinder and bit dresser, which is skid-mounted in a small shack close to the drilling spread. One man tends the grinder and resharpens all the dull bits which the drill crew turns in each day.

Wet Blasting

Because of exceptionally heavy groundwater problems, blasting with ammonium nitrate has been clearly out of the question. Wood-Kirst is using Hercules, Atlas and DuPont blasting powders, ranging from 60% gelatin sticks to 40% gelatin and 40% bag powder. Delay caps also are used to shape the 2 on 1 slopes accurately with a minimum of shaking and overbreak, and to get a secondary breaking and piling effect out in the main cut portions. The average blasting ratio has

Broken rock is gouged out of a shallow cut by a 2½-yd. shovel. Euclid carries load to fill area where it is dumped in thin lifts.

been approximately ¾ pound of powder per cubic yard drilled.

The job was staffed at the start with an adequate supply of heavy power shovel equipment, including what Frank Wood believes may be a forerunner of many more such installations as highway jobs grow bigger. Wood was referring to a Bucyrus-Erie 88-B shovel equipped with a 4-yd. dipper, which was purchased new for this project.

a smaller shovel. And there's been very little downtime for repairs."

In addition to the 88-B, the company has brought in two Bucyrus-Erie 54-B's with 2½-yd. dippers, two 2½-yd. Northwest 80-D's, a Northwest 25 dragline for miscellaneous excavation and a Lorain model 41 backhoe for drainpipe excavation. There's also a Bucyrus-Erie 22-B Transit Crane on the job for miscellaneous structure excava-

Northwest Model 25 dragline at gravel pit loads pit-run material with 2-yd. bucket for short haul to the 30 x 40 primary jaw crusher powered by a Cat diesel.

"A 4-yd. shovel is entirely practical on this kind of a highway job," he explained. "There's enough muck in these big highway jobs now to justify tearing down such a machine and moving it in five or six loads. Also, with a 24-ft. paved surface, 10-ft. shoulders and your slopes, you've got enough room to work one of these big machines so that it can swing freely and your hauling equipment can get under it. It will dig just about twice the output of a 2½-yd. machine, and do it with the same single operator and oiler.

"The bigger rig has the kind of stamina which helps out on this kind of a job, too," Wood continued. "This broken granite nearly always has a tight digging toe and it's hard to break out the big boulders. But with a 4-yd. dipper, you've got enough dipper capacity and bail pull to handle these big rocks freely—much more so than you have on

tion, pipe placing and handling of logs and stumps. Actually, it's about as busy a machine as the big loading shovels.

Hauling units under the shovel fleet include five Euclid 63-TD trucks rated at 22 tons, and 12 Euclid 91-FD's rated at 18 tons. The larger trucks are of course used under the 88-B shovel principally, while the smaller units are used with 2½-yd. shovels.

The Euclids haul the broken rock to dump points in the fills and end dump it in lifts not over 2½ feet thick. Occasionally there are large boulders bigger than that in size and they are worked wherever possible into the bottom of the deeper fills or "melted" down. Very little water has been necessary in the placement of rock fills, chiefly because the material is already damp when it's dug.

In addition to the shovel loading fleet, Wood-Kirst is running a scraper operation. In fact, the only really large cut in the job—one containing 200,000 cubic yards—is being moved entirely by scrapers. It consists of dirt and water-logged shale and has presented a never-ending drainage problem. In the scraper fleet are three Caterpillar DW21's and three Euclid S-18's. These are being loaded by tandem pusher assistance of Cat D8's and D9's. All told,

It Really Takes Equipment

Very frequently these days the equipment investment on a major highway job totals nearly half the value of the job itself. Consider, for example, these major items of equipment which Wood-Kirst had to bring in to the High Sierra project:

20 Caterpillar D8 tractors
1 Caterpillar D9 tractor
2 International TD-24 tractors
3 Caterpillar No. 12 motor graders
1 Bucyrus-Erie 88-B shovel
2 Bucyrus-Erie 54-B shovels
2 Northwest 80-D shovels
1 Northwest 25 dragline
1 Lorain 41 backhoe
1 22-B Bucyrus-Erie Transit Crane
12 Euclid 91-FD trucks
5 Euclid 63-TD trucks
3 Caterpillar DW21's
3 Euclid S-18's
1 Cedarapids rock crushing plant
1 Buffalo-Springfield Kompactor
2 Three-wheel Huber steel rollers.
1 Tampo self-propelled pneumatic roller
4 Southwest sheepsfoot rollers
3 Mack 10-wheel trucks
5 Gardner-Denver 900-cfm compressors
3 Gardner-Denver 600-cfm compressors
1 Gardner-Denver 365-cfm compressor
2 LeRoi 125-cfm Tractairs
7 Gardner-Denver Air Trac drills
4 Tractor-mounted Gardner-Denver drills on Hydrabooms
9 Homelite chain saws
1 Blount bit grinder

Forms for bridge piers of the twin roadways are erected at a stream crossing. A Marion 35-M truck crane pours the concrete.

there are 23 tractors on the job, including 20 D8's, one D9 and two International TD-24's. Six Cats are equipped with Ateco and Caterpillar rear-end rippers, and have helped out the scraper loading.

Following the disposal of scraper-dumped material, which is deposited in lifts considerably shallower than in the rock fills, the material is compacted to a uniform density representing about 95% of the Modified AASHO test. Compaction is being handled by a Buffalo-Springfield Kompactor, two three-wheel Huber steel rollers, a Tampo self-propelled pneumatic and four sets of Southwest sheepsfoot tampers. In the few places where it has been necessary to haul water, the material has been delivered by truck-mounted tank sprinklers.

The job calls for astronomical quantities of crushed rock to form the roadway and sub-base topping off the earthwork. For example, the main 24-ft. wide pavement on each lane will consist of 8-in. thick portland-cement concrete laid on four inches of special, select cement-treated base material, and there will also be 12 inches of imported base material under that. The 10-ft. shoulders also will have heavy granular sub-bases underneath and asphalt plant-mixed surface topping. Since the contract calls for production of all this material, including concrete and hot-mix asphalt aggregates, a sizable crushing-screening setup was in order.

Wood-Kirst's crushing setup, designed by Iowa Mfg. Co., consists of a Cedarapids feeder and hopper, a 30 x 40 primary jaw crusher, elevating conveyor, a 5 x 14-ft. multiple-deck vibrating screen plant, a Symons 4-ft. standard cone crusher, a secondary 4 x 14-ft. vibrating screen system and an Eagle washer which will be used when concrete aggregates are produced. The plant is tied together by Kolman discharge conveyors, including two large Kolman radial stackers. The plant layout is highly efficient and is capable of producing from 6,000 to 7,000 tons per 10-hour shift. The stockpiles are served by tunnels which permit fast, easy truck loading. The plant is also fully electrified by Caterpillar D342 diesel electric generating units, which furnish power for the various motors around the plant. The Symons cone crusher is directly powered by a Caterpillar diesel engine, as is the primary jaw.

The large, single pit which will serve the project is located near the west end in a streambed. In the old days when the railroad first started serving the continent over Donner Pass, this area was used for the production of wood. Waste wood material partly contaminated the

(Left) Pushed by a Cat D9, a Euclid S-18 scraper takes on a load from a cut. (Right) Buffalo-Springfield Kompactor consolidates fill.

upper 10 feet of the gravel pit surface with tannic acid, which is harmful to concrete aggregates. For that reason, the top 10 feet can be used only for untreated imported base material. Below the 10-ft. level, however, cement-treated base materials, concrete and asphalt aggregates all can be produced. Since these materials will be hauled by large semi-trailers rented from a commercial truck hauler, the company also purchased a 70-ton Murphy scale for doing the weighing.

The pit materials are loaded by the Northwest 25 dragline. One of the Bucyrus-Erie 54-B's was scheduled to be equipped with a dragline boom and 2½-yd. bucket for loading this material also.

To a very great extent equipment upkeep has been minimized by the original selection of machines for the job. Frank Wood pointed out that all machines brought on the job either were brand new or had recently been completely overhauled to place them in new condition. This, of course, minimizes the breakdown or repair factor since equipment can be expected to operate several thousand hours before major repairs are due. The Bucyrus-Erie 88-B shovel, for example, operated 710 hours in its first three months and had only five hours of downtime.

The field repair setup consists of usual field shop facilities, trailers for spare parts, 24-hour-a-day mechanic service and mobile field lubricating units. Union Oil products, including fuels and lubricants, are being used exclusively.

The chief preventive maintenance trick consists of taking a limited spread of equipment off of production on Saturday, having the master mechanic and his staff give it a thorough cleaning and inspection, and to make whatever operating repairs or adjustments are necessary for the weeks ahead. The next Saturday another spread of equipment is worked on in the same manner, and so on until all units have been covered.

Airplane Supervision Helps

According to Frank Wood, there's nothing like airplane service to make a construction organization more efficient.

Last year, Clyde W. Wood & Sons, Inc. bought a two-motor Aero-Commander model 500 ship. Having the plane lets Wood and Kirst get up to the job on Monday, stay through Friday or Saturday and spend a week end in Los Angeles County with their families. Between times, Stanley Wood of the organization uses the plane to manage a flood-control project in Los Angeles County and a channel excavating job for Southern California Edison Co. at Oxnard in Ventura County. The plane has come in handy in many a pinch, flying badly needed parts or supplies out to some job. On the High Sierra project, Wood was lucky enough to find an old, abandoned CAA airstrip only 20 minutes away from one end. He asked for and received permission to rehabilitate the runway a bit, and uses the strip for his commuting.

The plane has made job supervision easier, promoted better bidding by letting executives get around to really see the work and has made the field jobs themselves more efficient.

According to Master Mechanic Bill Hansen, the principal secret of adequate equipment upkeep today is clean fuel, adequate lubrication and operation and maintenance strictly in accordance with manufacturers' instruction booklets.

The contractors used the subcontract system to good advantage in building the reinforced-concrete structures on this project. All told, there are three major crossings of streams involving two large reinforced-concrete bridges at each crossing. There is also a bridge over a haul road. All structures were subbed out to the Palo Alto (Calif.) firm of Bo-Son, Inc., a joint venture composed of Contractor Howard Bond and his partner, Don Anderson.

Concrete Plant

The well-organized layout includes a central Willard concrete-mixing plant, a Case loader to charge the bins and Ideal sacked cement. Forming is being done chiefly in the field by fabricating the panels of plywood and conventional 2 x 4 studs, then setting them in place and anchoring with steel form ties. Underpinning consists chiefly of old wood piles set on timber pads below the bridges. The concrete is either placed by crane and handling bucket, or by buggies in some cases. The structure work has gone along rapidly and has not interfered with excavation.

For the joint-venture contractors, the project is under the general supervision jointly of Jim Kirst and Frank Wood, who commute once or twice a week between Los Angeles and the project by private airplane. Andy Weesner is general superintendent in residence on the job, assisted by Bill Hansen, master mechanic; Lou Barba, job engineer; and Tommy Condon, office manager.

Heading up personnel of the California Division of Highways is George McCoy, state highway engineer. A. S. Hart is district engineer of District 3, under whose supervision the project is being built. L. R. Hawkes is resident engineer.

Here are Supt. Andy Weesner (left), and Frank Wood of Clyde W. Wood & Sons. Wood frequently commutes between Los Angeles and the job by private plane.

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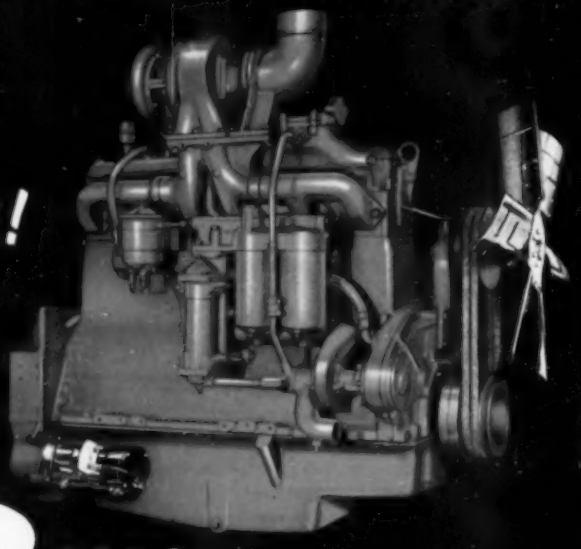

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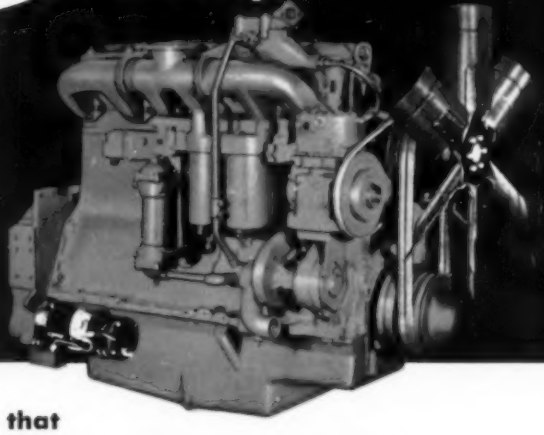

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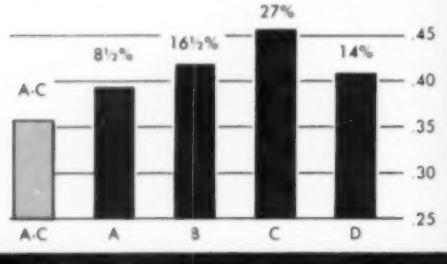

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POWER FOR A GROWING WORLD

This Pennsylvania town has a superhighway passing through it. While a 3-yd. shovel loads rock, drilling continues in background.

Electric Blasting Caps and Children

by R. J. Behley
Travelers Insurance Co.,
Hartford, Conn.

Highway program has made blasting in populated areas commonplace. Here are safety hints to prevent dangerous detonators with "pretty" wires from falling into hands of children.

ENORMOUS quantities of explosives are used in construction operations, particularly road building. Correspondingly large numbers of detonators (blasting caps) are required. Because of mishandling, misfiring, pilferage and other reasons, many blasting caps find their way into the hands of children and irresponsible grownups.

Highly Sensitive

A blasting cap contains varying amounts of fulminate of mercury or some other equally sensitive explosive that will detonate at temperatures of about 350° F, or when struck a sharp blow.

An exploding blasting cap can blow a hole through a $1\frac{1}{8}$-in. thick steel plate. It can throw fragments of the copper shell, metal splinters, pieces of rock or gravel as far as 200 feet (two-thirds the length of a football field). It can kill, cripple, destroy sight or otherwise seriously injure anyone exposed to its explosive effect.

An average of more than 200 children have been injured annually in blasting cap accidents. With the nation's greatly expanded program for building highways—many of which are routed through populous areas—the control of blasting cap hazards becomes an acute problem.

Negligence on the part of adults is the primary cause of the majority of accidents involving children and caps.

The vari-colored wires of millisecond delay detonators attract children. Youngsters often venture into blast areas to obtain the wires. Live caps sometimes remain attached to the wires due to misfirings or cutoffs. Caps are occasionally dropped or misplaced by blasting personnel. Because of these and other circumstances, the live caps get into the hands of children. The inquisitive young ones experiment with the caps and, too often, serious injuries and deaths result. Having been attracted into the area by the "pretty" wires, the children also are exposed to other hazards, such as overhanging banks and water holes.

Safety Hints

Injury of children by blasting caps can be prevented. But preventive measures must not be haphazard. The contractor should insist on observance of specific safety measures relating to use of explosives. Among such measures are:

1. Maintenance of locked storage facilities.
2. Accurate control of stocks of explosives and quantities of caps removed from magazines for use.
3. Prompt return to storage of unused explosives and caps.
4. Strict accounting of every stick of dynamite and every detonator used or returned.

Blasters operating in populated areas or where watchman service is not available should pull all blasting wires in order to (1) assure that there is no live cap attached and (2) forestall attracting children into the area.

In all places where blasting is being done, parents and teachers should warn children repeatedly of the hazards of handling or playing with blasting caps. Where blasting operations are to be conducted over a considerable length of time, the contractor should obtain safety publications relative to blasting caps (posters and circulars) from the explosives supplier or the Institute of Makers of Explosives, 250 E. 43rd St., New York 17, N. Y., and distribute such safety material to teachers for discussion and posting in school rooms. Distribution can be made by the contractor's representative or by a local police or fire official.

Hartwell project consists of a concrete dam flanked by earth embankments, a reservoir and a 264,000 kw capacity power plant.

Dam Project Harnesses Savannah River

Contractors devise efficient methods to handle 900,000-yd. concrete job. Hartwell project is one of 11 reservoir-dam systems proposed to meet needs of industrializing Southeast.

WHERE the Savannah River winds a crooked course to divide Georgia and South Carolina some 300 miles north of its mouth at the Atlantic Ocean, a $100 million multi-purpose development is underway.

It's the Hartwell project, second step in a federally-sponsored, long-range program for the comprehensive development of the Savannah River Basin. Consisting of a concrete dam flanked by earth embankments, a reservoir and a power plant, Hartwell is being built to reduce flood damages, to generate hydroelectric power and to regulate river flow in the interest of barge navigation below Augusta, Ga.

It will be operated in conjunction with existing Clark Hill Dam and reservoir—67 miles downstream from Hartwell—and will be the second of 11 proposed reservoir-dam systems along the Savannah River authorized by Congress more than a decade ago to serve the growing needs of a very rapidly industrializing southeastern United States.

Under direction of the U. S. Army Corps of Engineers, Savannah District, work on the Hartwell project began in October 1955, when the firm of M. R. Thomason, Montgomery, Ala., started a $1.5 million contract calling for construction of 16,000 feet of earth embankment for a 2,850,000 acre-foot flood control and power reservoir. A large, fast-moving spread of scrapers, dozers, shovels and hauling units completed the job in 21 months, handling some 2½ million yards of dirt during that time.

Build Several Bridges

Waters backed up by the reservoir will necessitate relocating highways and building several bridges. One of the first roadways to be inundated is U. S. 29, a major primary route into Atlanta, Ga. Its relocation was completed in June 1957 by J. C. Critcher, Inc., of Asheville, N.C., on a $337,000 contract.

Tidwell Construction Co., Douglasville, Ga., finished a $685,000 contract in July 1958, for relocating the highway 29 bridge from above to ½-mile below the Hartwell Dam site. Work on the bridge started in May 1956; its completion was delayed several months due to a steel shortage.

Main contract of the Hartwell project is a $21.9 million undertaking held by Hartwell Dam Contractors, Inc., a joint venture of Guy F. Atkinson, South San Francisco, Calif., sponsor; Ostrander Construction Co., Portland, Ore.; and Soo Constructors, Winona, Minn.

Major items of this contract include:

1) Constructing a dam and spillway requiring 900,000 cubic yards of concrete.

2) Installing five 125-ft. long steel penstocks in the dam.

3) Installing twelve 40-ft. wide by 35-ft. high spillway gates and hoists and five intake gates and hoists furnished by the government.

4) Excavating to bed rock for an ultimate five generator powerhouse and excavating the tailrace for a distance of 1,600 feet downstream of the powerhouse.

5) Installing two 5-ft. 8-in. x 10-ft. sluice gates furnished by the government.

6) Building earth terminal cones with 1,300,000 yards of compacted fill.

7) Placing 3,400,000 pounds of reinforcing steel and 77,000 pounds of copper water seals.

8) Dumping 384,000 yards of rock along the reservoir embankments.

Completed, the dam and spillway will measure 1,900 feet long, 240 feet high from its lowest point at bedrock, 155 feet wide at its deepest point and 20 feet wide at its crest. Building a structure of this size demands a big investment in equipment, the best in operational efficiency and topnotch supervision.

After the main contract was awarded, Hartwell Dam Contractors obtained approval from the Corps of Engineers to use an alternate river diversion scheme in place of the Corp's standard two-step plan. Object of the revised scheme was to facilitate diversion work and at the same time permit concrete to be placed with a minimum of interference. By using this alternate plan, the contractors hope to finish the dam a year ahead of an October 1961, deadline.

Concrete for the dam cannot exceed a temperature of 55° F when being placed in forms. This specification offsets the heat of hydration produced as the concrete sets.

Hartwell Contractors are meeting the temperature requirement by cooling the aggregate, sand and water used in mixing the concrete. In doing so, they are successfully applying a vacuum-type re-

(Left) Gardner-Denver drill bites through hard granite in quarry pit as it prepares blast holes. (Above) Rock is loaded into 22-yd. Euclid by a 4½-yd. electric shovel.

Euc empties load into Allis-Chalmers 42 x 65 Superior gyratory crusher. Plant produces four grades of stone plus sand.

frigeration process never before applied in the construction industry, according to officials of the Atkinson-Ostrander-Soo joint-venture firm.

Here's how it works.

Five cylindrical vacuum tanks have been erected near the concrete batch and mixing plant. Three of these hold 250 yards of coarse aggregate each; two hold 100 yards of sand each. A 200-ft. long conveyor belt carries the aggregate and sand from a nearby receiving hopper to a shuttle conveyor rigged on top the tanks. When filled, vacuum-tight gates on top and bottom are sealed. Air trapped within is then evacuated by sending steam at high velocity through jet boosters which are connected to the vacuum tanks by a header pipe.

Control Temperature

As atmospheric pressure inside the tanks drops, the boiling point of water drops. Surface moisture on the aggregate vaporizes when any given boiling point is reached, steadily cooling the aggregate. A desired temperature can thus be attained and held constant by controlling atmospheric pressure, determined by the number and frequency of "steam jet streams" applied in the cooling process.

Aggregate comes out of the vacuum tanks at 40° F—15° below the minimum required. Carried from the tanks by a 165-ft. long conveyor to the batch and mixing plant, it is carefully weighed and combined with cement and water to attain the correct concrete consistency for placing in forms.

In conjunction with actual placing of concrete for the dam, Hartwell Contractors have set up a gigantic crushing plant to produce aggregate. Plant and quarry are located 1½ miles downstream from the dam on the Georgia side of the Savannah River.

The quarry contains a hard, gray granite. Some 1½ million yards of this material will be blasted before dam construction is complete. It must also yield 384,000 yards of maximum 5,000-lb. rock which is being used as protection for the reservoir embankments. The rock is being dumped 6-ft. thick normal to the slope of the bank.

Drilling in the quarry pit is done with crawler-mounted Gardner-Denver model 7CWD Air Trac's using 2-in. carbide-tipped Timken and Brunner-Lay Rok-Bits on Gardner-Denver drill steel. They drill an average 20-ft. lift on 5 x 6-ft. centers. Each Air Trac puts down about 280 feet a day.

Power for the drills comes from a

Aggregate and sand used in mixing concrete for the dam are cooled by placing in cylindrical vacuum tanks shown above. Building at left houses boilers which produce steam needed to carry out refrigerating process. Temperature is accurately controlled at constant 40° F, which is 15° below minimum required for the concrete.

HARTWELL PROJECT DATA

Reservoir

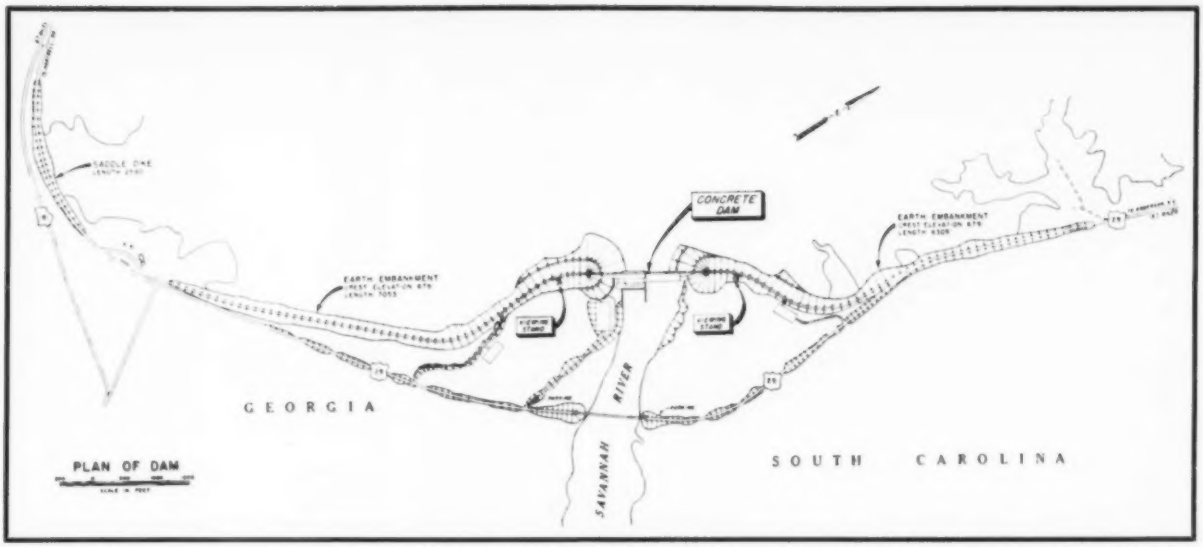
Length—Savannah River	7 miles
Seneca and Keowee Rivers	38 miles
Tugaloo River	42 miles
Shoreline (mainland) El. 660	960 miles
Area—Flood pool—El. 665 M.S.L.	61,900 acres
Power pool—El. 660	56,400 acres
Storage volume in acre feet:	
Total storage to El. 665	2,858,100
Power pool El. 625-660	1,427,600
Flood control El. 660-665	295,000
Drainage area	2,088 sq. miles
Maximum depth at dam	185 feet

Dam

Length—Total	17,850 feet
Length—Concrete section	1,900 feet
Length—Earth embankment—South Carolina	6,309 feet
Length—Earth embankment—Georgia	7,051 feet
Length—Saddle dike—Georgia	2,590 feet
Average height (concrete section)	204 feet
Size of each of 12 spillway (tainter) gates	40 ft. wide x 35 ft. high
Outlet sluices—2 size opening	10 ft. wide x 5 ft. 8 in. high
Diameter of penstocks	24 feet
Concrete required	900,000 cubic yards
Earth fill in embankments	4,000,000 cubic yards
Earth excavation	175,000 cubic yards
Rock excavation	250,000 cubic yards

Powerhouse

Number of power units (generators)—Initial installation	4
Ultimate installation	5
Capacity of generators, each	66,000 kw
Total annual output (average)	453,000,000 kwh
Stream flow:	
Natural annual average (cfs)	4,400
Net regulated (cfs)	4,300
Average critical period (cfs)	3,560



Completed dam and spillway will measure 1,900 feet long, about 240 feet high from its lowest point at bedrock and 155 feet wide.

stationary bank of three electrically-driven Gardner-Denver compressors which pump into a receiving tank holding 125 pounds of pressure. Air is fed to the pit by a series of connecting pipes ranging from 6 inches in diameter at the receiving tank to 1¼ inches where tapped by the drills.

Shooting is done toward late afternoon hours daily. Explosives used are 1½ x 12-in. sticks of 40% gelatin-type dynamite of Hercules, Atlas, DuPont and Olin-Mathieson brands. Shots are detonated with Atlas electric caps set off by a 440-volt battery. About 3,000 yards of broken material are brought down with each shot on approximately a 1-lb. powder to 1-yd. rock ratio. To eliminate the danger of misfires, no more than 1,100 holes are detonated at a time.

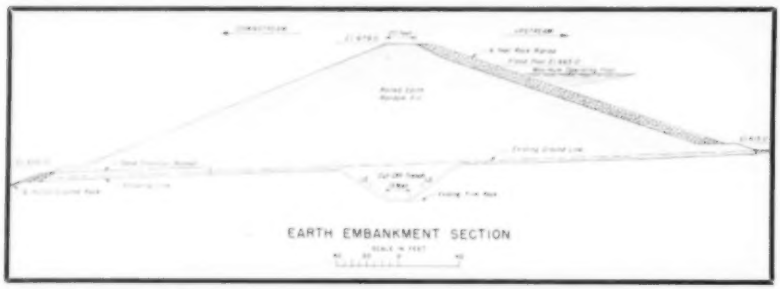
A 4½-yd. Bucyrus-Erie 110-B shovel loads broken rock from the quarry face into a fleet of twelve 22-ton Euclid end-dumps, which either haul to the plant's crusher or carry rock to the reservoir embankments. Distance from loading face to crusher is an average 1,000 yards; dumped rock hauls are up to 3 miles.

Working two 8-hour shifts a day, the 110-B loads out approximately 3,200 yards per shift. The granite is so abrasive that a graveyard shift crew hard-surfaces the shovel's dipper and teeth adapters nightly with Raynite B nickel manganese steel bar. Dump bodies of the Eucs have been protected against shock and excessive wear by welding several ¼ x 4-in. strips of steel to each truck bed.

The plant's primary crushing unit is an Allis-Chalmers 42 x 65 Superior gyratory with a discharge opening set at 7

(Left) Workmen cure concrete with water and compressed air. (Right) Crane lifts skip pan of granite chipped from bedrock.

Dozer pushes clay and huge slab of granite while helping to build 1,600 feet of earth embankments. (Below) Cross section shows how embankments are constructed.



Rock is loaded into Tournapull rear-dump on embankment job. M. R. Thomason, Montgomery, Ala., held the $1.5 million contract. Earthmoving was completed in 21 months.

Allis-Chalmers TS-260 scraper excavates dirt used in building terminal cones requiring 1.3 million yards of compacted fill. Scene is from South Carolina side of river.

inches. Secondary and tertiary crushers produce four grades of stone—6 to 3-in., 3 to 1½-in., 1½ to ¾-in. and ¾-in. to No. 4 mesh. After being separated and washed, each size is put into a bin for storage. From here, the material is either recrushed or sent by shuttle conveyor to storage piles. It can then be loaded into 20-yd. Peerless bottom-dump trailers pulled by International model R212 diesel cabs. The R212's haul to a 10-ft. diameter receiving hopper near the aggregate vacuum tanks, a distance of nearly 1½ miles.

Sand needed in mixing concrete for the dam is also produced at the crushing plant. Minus No. 4 mesh is processed with three Dorrco sizers and two 66-in.

Duplex classifiers. Additional fine aggregate is prepared with two 6x12-ft. Marcy rod mills, set to crush minus ¾-in. material. The final product is carried on a 300-ft. long shuttle conveyor to one of three stockpiles where it is stored until used.

When the notes for this article were gathered, a C. S. Johnson batch and mixing plant with a capacity of 340 yards an hour turned out the concrete, which was hauled to the dam site in 4-yd. Gar-Bro pour buckets mounted on lowboy trailers pulled by R200 International tandem cabs.

Erect Trestle

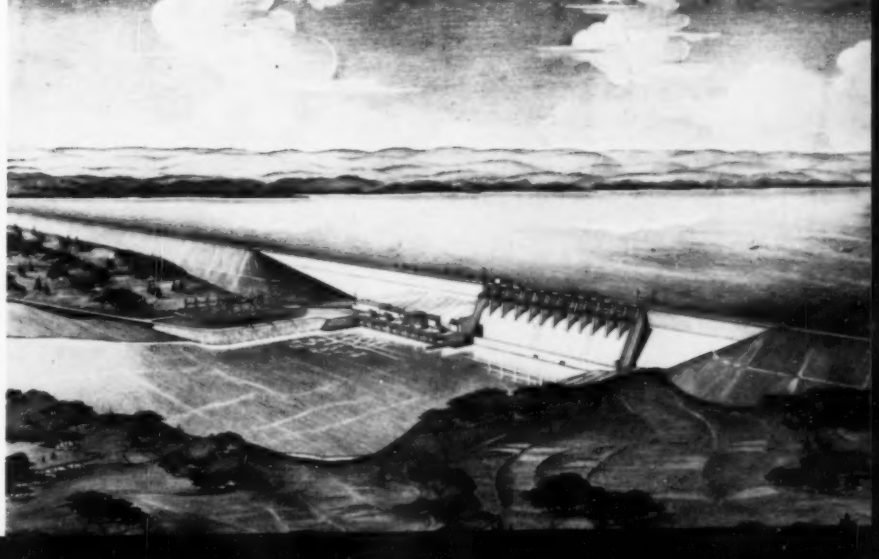
This hauling method has been discontinued, however. A construction trestle recently was erected above the dam on which were laid standard-type railroad tracks running from the batch plant across the length of the trestle. Flat cars modified to carry four pour buckets each are pulled along the trestle by 150-hp General Electric diesel locomotives. Two American Revolving cranes, also mounted on the trestle, swing the buckets to the pour. With complete hook coverage over the dam, the large cranes place some 3,000 yards of concrete a day.

Since aggregate and sand used in mixing the concrete can be accurately controlled at 40° F, Hartwell Dam Contractors have been able to place mammoth 7½-ft. lifts. As the lifts are placed, the concrete is consolidated by crews using Malan hand vibrators. Forms are stripped within 36 to 48 hours. Curing then takes place for 14 days, during which time the concrete is green cut with water and compressed air.

The river bed at the dam site consists of granite, the top one to two feet of which were eroded and decomposed. This material had to be removed by shooting to close tolerances and to very shallow depths. Fragmentation was poor and a lot of secondary drilling had to be done. Before the base lift is placed on a section, crews with shovels, crowbars and pick axes must often still dig out "spots" of decomposed rock so a solid dam base is assured.

In excavating for the five-unit powerhouse, Hartwell Dam Contractors face

Personnel for Hartwell Dam Contractors include from left: Dick Byers, project engineer; V. R. Bradley, project manager; and L. P. Jennett, assistant project manager.



(Left) Dragline scoops bucket of dirt to fill truck while working upstream from dam site. In background is part of rock blanket being dumped along earth embankments. (Below) Drawing shows artist's conception of completed dam with filled reservoir.

Maxi-mounted crane hoists beam for trestle (middle left) being built across dam site as men dig ditch (right foreground) for aluminum pipe carrying air to drills working on powerhouse chamber. Pour buckets (middle right) are mounted on lowboy trailers.

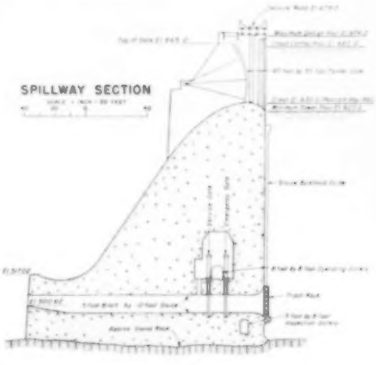
a difficult task. Specifications call for a 30-ft. deep, 68-ft. square chamber to be dug out of the bedrock for each unit. The walls of this chamber must be smooth and as nearly vertical as possible. This calls for line drilling, which involves putting down 10-ft. lifts of 2¼-in. holes on 3½-in. centers. When drilling is completed, webbing between the holes is removed with broaching steel used on the same drills. Gardner-Denver URM wagon drills then move in to prepare 2¼-in. blast holes in the broached out area. An aluminum pipeline, quick-coupled over rough ground, brings air from a stationary bank of six Gardner-Denver WBJ compressors to the work area. Flexible rubber hoses tap into the line at convenient points to feed the drill rigs. Shooting is on about the same basis as that done in the quarry, except two shots are made a day instead of one.

Rock blasted at the dam site is loaded into 22-ton Euclid end-dumps by a 2½-yd. Bucyrus-Erie 54-B shovel. This rock is dumped along reservoir embankments.

A Bucyrus-Erie 71-B and a 38-B, both rigged as cranes, also work around the dam site. They have been used as draglines to dig sand for cofferdam fill. The smaller machine is occasionally used as a shovel to load broken rock out of the riverbed. The 71-B sometimes placed concrete and helped erect plant facilities.

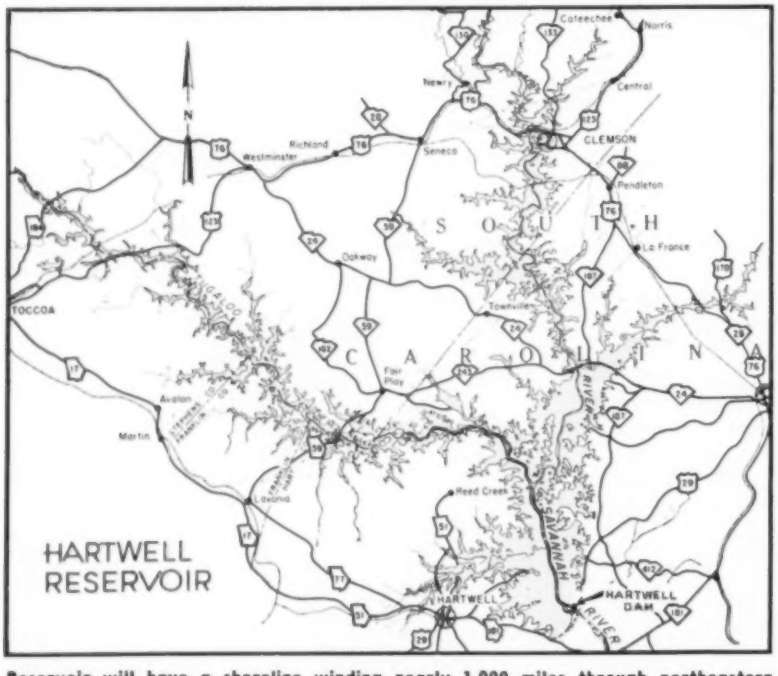
Block Off River

No river diversion tunnels are being used in the construction of Hartwell Dam. Work is kept in the dry by earth dikes and a composite cofferdam of some 50 cells. These dikes can be moved to channel water down one side or another of the riverbed. Each cell of the cofferdam is a sand-filled structure 32 feet in diameter, made of 15-in. U. S. Steel interlocking sheet pilings.



The preventive maintenance program set up by Hartwell Dam Contractors has kept repair costs at a minimum. All rolling equipment get regular 500 and 1,000-hour checks. Close attention is paid to oil change and chassis lubrication. A maintenance shop is equipped to do any repair work, except motor rebuilding, and a large spare parts inventory is kept on hand so no piece of machinery is sidelined too long.

Key personnel for Hartwell Dam Contractors include V. R. Bradley, project manager; L. P. Jennett, assistant project manager; Dick Byers, project engineer; and Lew Sheddy, general superintendent. The Hartwell project is under the supervision of Col. R. C. Bahr, U. S. Army Engineer district, Savannah, Ga. Charles A. Jackson, Jr., is resident engineer for the Corps. Ross Wylie is assistant resident engineer, R. B. McElreath is chief of field engineering and O. R. Summer is chief of office engineering.



Reservoir will have a shoreline winding nearly 1,000 miles through northeastern Georgia and northwestern South Carolina. Note major highways to be inundated.

BUCYRUS-ERIE COMPANY uses 14 Timken bearings at critical points in the crowd, main and swing machinery of the "River Queen" to take radial, thrust loads in all combinations.
BUCYRUS ERIE
RIVER QUEEN

Giant shovel swings 80-ton bites 300 ft., stacks 'em 100 ft. high, 14 TIMKEN® bearings take the loads

IT'S a whopper!—this Bucyrus-Erie 1650-B stripping shovel. It weighs in at over 2,400 tons, rises 140 ft. high. Taking 80-ton bites of overburden, it can pile up a "mountain" of 100,000 tons in a 24-hr. period. 15 electric motors power the giant, one of the largest mobile land machines ever built in the U. S. Yet one man in an air-conditioned cab controls the entire digging operation.

To take terrific radial and thrust loads 14 Timken® tapered roller bearings are used at critical points in the crowd, main and swing machinery. Their tapered design enables them to take any combination of radial and thrust loads. The full-line contact between rollers and races gives Timken bearings extra load-carrying capacity, too. And they shrug off shock loads; they're case-carburized to have hard, wear-resistant surfaces and tough, shock-resistant cores.

Timken bearings are geometrically designed to roll true. And they're precision-made to live up to their design. They virtually eliminate friction. And by keeping housings and shafts concentric they make closures more effective. Dirt stays out; lubricant in.

We even make our own electric furnace fine alloy steel, for extra quality control. No other American bearing maker does. For your No. 1 bearing value, specify bearings trade-marked "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

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TAPERED ROLLER BEARINGS ROLL THE LOAD

Keeping It in the Family

Only one of the Meads, Dean, 27, was missing when *Excavating Engineer* snapped this picture. In front are (from left): Herbert, 29; Edward, 21; Walter, 19; and the father, Wayne. In the back row are Ralph, 37; Howard, 32; and Harold, 35.

It's a family show of seven brothers and their father when Mead Bros., Springport, Mich., accepts a job. Here's how they overcome obstacles on an interesting storm and sanitary project.

WHEN Mead Bros., Stringport (Mich.) contracting outfit, accepts a job, a united front of seven brothers and their father can be arrayed to get it done.

Mead Bros. is a family circle of father Wayne and his seven sons (count 'em): Ralph, 37; Harold, 35; Howard, 32; Herbert, 29; Dean, 27; Edward, 21; and Walter, 19. Three Mead daughters are not in the partnership which the brothers formed in 1947.

The brothers usually are scattered on three or four different jobs at a given time. Recently, four of the brothers and their father combined their ingenuity and muscles on an interesting sewer project in East Lansing, Mich., for Michigan State University.

Though relatively small in cost and scope—$123,000 for 1,600 feet of storm and sanitary sewer—the job presented several interesting features for the brothers and onlookers alike.

Interest was created in the beginning with the university's selection of pipe for the lines, which extend south from Red Cedar River along Harrison Rd. The storm empties into the river; the

This is the Meads' job in East Lansing, looking north on Harrison Street. The 30-B hoe is ditching a trench 20 feet deep while the 30-B crane, operated by Herbert Mead, prepares to lower in a big 6-ft. section of storm pipe weighing 14,700 pounds.

sanitary ties into an interceptor there.

Elliptical concrete storm pipe (A.S.T.M. C-76-III) equivalent in size to 72-in. round pipe—was chosen for this job. One university inspector said that elliptical pipe had greater dry weather velocity, strength and capacity when compared to equivalent size round pipe. This pipe was furnished by Lamar Pipe & Tile Div., American-Marietta Co., Jackson, Mich.

Chemical wastes from university laboratories would be flushed into the sewage line, so the university specified 27-in. C-200 vitrified clay sanitary pipe. Slip-seal joints were used.

Parallel Sewers

The Meads placed the piping in an open cut ditch that averaged 21 feet in depth, with some sections going down to between 30 and 40 feet. The sanitary sewer was placed at the bottom of the ditch; the storm sewer, two feet above and seven feet to the side of the sanitary. Sand backfill was used.

"We're excavating mostly sand," said Herbert Mead, spokesman for the brothers. "The sand hasn't been cavey. In fact, we're happy we've got sand because we use it for fill. Water's been no problem either, but we're set with more trench wellpoints. We have 600 feet of header."

The Meads finished the job using 526 feet of wellpoints. What did prove troublesome to the brothers was the obstacle-course route of the lines, which had to be laid under:

1. A gilsulated steam line.
2. A 2 x 2-ft. concrete steam line tunnel.
3. A high voltage electrical conduit belonging to the Michigan state police.
4. An 8-in. high-pressure gas main.

The Meads successfully worked under all of these lines without damage by supporting them with a truss-beam fabricated by one of their employees, Stanley Morgan.

One observer figured that the Meads had saved as much as $1,000 by preserving the gilsulated steam line.

"The gilsulate is like sand and will fall away when the dirt is taken away," said the observer. "The Meads saved this one by wrapping it with burlap and wire and supporting it with the truss-beam."

The job had to be done in little more than two months' time. To do it, the Meads gathered a spread of equipment that included two Bucyrus-Erie 30-B's —their own hoe and a rented crane; a P&H 255-A clamshell; two ¾-yd. Insley L's; an International TD-18 and a TD-14 bulldozer; an Adams No. 512 motor grader; and from two to five Chevrolet and GMC 5 and 10-yd. dump trucks.

Four of the brothers were operating equipment the day *Excavating Engineer* visited the job. Herbert was at the controls of the 30-B crane, Edward had the

Continued on page 59

After several sections of elliptical storm pipe are set, Howard Mead operating an International TD-18 dozer pushes in backfill. In foreground, a 30-B dipper excavates the trench while a P & H 255-A clam (center) places material on top of the pipe.

MEAD BROS. EXCAVATING
Springport, Michigan

January 2, 1959

Excavating Engineer
South Milwaukee, Wisconsin
Gentlemen:

There is probably no setup like Mead Bros. in the whole U.S.A. At the close of World War II, Ralph, Harold and Howard came back from the army and navy with no particular job in mind. We had a 240-acre farm which was not large enough to provide work for the whole family. Having had some experience in excavating and drainage, we pooled our resources and bought a bulldozer. Since that time, everything we have except personal property is in one big pot.

Dean, the farmer, produces our milk, butter, meat and other products. He even helps in the excavating at times.

We have our differences, certainly, but never permit them to get to the point where we will not speak to one another. As has been stated, our family consists of seven boys, three girls, seven daughters-in-law, three sons-in-law and 23 grandchildren. The father spends most of the time in the office or on the road looking after various things.

Ralph operates a bulldozer and is our grader man and generally takes care of the surveying end. Our slogan is to cover nothing that we are ashamed for the inspecto. to see. Much of the success of this family can be traced to a wonderful mother.

Yours very truly,
Wayne Mead
Senior Partner

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can be worth thousands of dollars to you...

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	(check one)		
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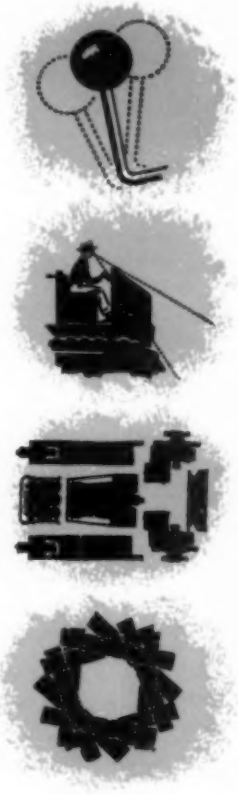
Are you open to facts . . . not fancies?	☐	☐	☐
Do you want a machine engineered for its job . . . not "adapted"?	☐	☐	☐
Do you want an 'automated' tractor, with no clutch pedal, that power-shifts?	☐	☐	☐
Do you want more work-output and less down-time?	☐	☐	☐
Is maximum visibility, as in an up-front position, important to the operator?	☐	☐	☐
Do you want custom-quality in every component . . . those you don't normally see as well as those you do?	☐	☐	☐
Do you agree that independent track operation means greater maneuverability and the ability to spin turn, fast and easy?	☐	☐	☐
Are you in favor of simplicity, as well as rugged design and engineering, in tractor transmissions and drives?	☐	☐	☐
Do you want a **modern** tractor, proven in use around the world?	☐	☐	☐
Be honest! Have you been "habit-buying" your tractors and tractor units?	☐	☐	☐



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BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Channel Stabilization Cleans Up Muddy Missouri

River improvements between Kansas City and St. Louis, Mo., are a phase of far-reaching program. Corps of Engineers will provide a self-cleaning channel 300 feet wide and 9 feet deep.

by L. H. Houck

A DREAM of more than half a century of a full-season navigable channel in the cantankerous and unpredictable Missouri River has now come true. Hundreds of miles of shore line have been molded to plans for bank stabilization developed by the U. S. Army Corps of Engineers, Kansas City (Mo.) district.

Swinging into action a year or so ago with new methods for controlling the Missouri's tendency to cut its own channels, the Corps of Engineers has completed 89% of its bank stabilization and channel navigation project between Kansas City and the mouth of the river at St. Louis, Mo. Contracts have been let and work is underway on the balance.

Self-Cleaning Channel

The refinement of old methods and the development of new methods is providing a channel 300 feet wide and 9 feet deep that is self-cleaned by the hydraulic action of moving water. This channel will eventually reach from St. Louis to Sioux City, Iowa. Water impounded in the big dams on the upper reaches of the river now can be used to maintain a 9-ft. channel during dry seasons. In times of heavy rains water held back will aid the overall flood control program.

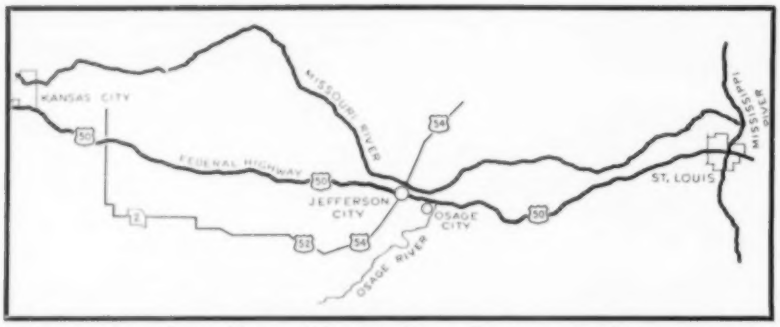
The St. Louis to Kansas City project is an essential part of the comprehensive multi-million-dollar plan for full development of the huge basin.

The Missouri River basin comprises an area of 529,000 square miles, one-sixth of the land area of the United States. Including all or part of 10 states, it is 1,300 miles long and 700 miles wide.

The entire length of the river is included in the comprehensive basin project—from its headwaters on the slopes

Quarry-run rock is end-dumped on barge by 10-yd. GMC truck for trip up river. The stone is placed in revetments and toe trenches by contractors Markham & Brown.

The *Bernice*, powered by a pair of GM 6-110 diesels, pushes its 350-ton cargo past site where a rig is replacing damaged piles.



Project between Kansas City and St. Louis, Mo., will provide stabilized channel 300 feet wide and 9 feet deep that is self-cleaned by the hydraulic action of moving water.

of the Continental Divide in Montana, down 2,460 river miles to its confluence with the Mississippi River a few miles north of St. Louis.

Many persons visualize the basin project as all flood control, but basically it includes far more. The plan aims at controlling every drop of water, wringing from it power, flood control, irrigation, drought control and commercial navigation. Each phase of the multi-pronged project is keyed to the others and returns benefits to all people and industries along the river. Property values will increase and river traffic will flow more regularly.

Without the big dams, such as Fort Randall, Oahe, Gavin's Point, Garrison and Fort Peck, to impound surplus waters and regulate the flow of the Missouri at both drought and flood stages, establishment of a permanent 9-ft. navigation channel for barges would be impossible.

Now that many of the dams are in operation and the bank stabilization project is nearing completion, the 9-ft. channel, once a dream, becomes reality.

The new concave, stone-clad banks forestall bank erosion, provide permanent bridge protection and already are providing a substantial reduction in the 9,000 acres of choice farm land washed away every year.

Experienced Contractor

Markham & Brown, veteran Missouri River contractor with headquarters in Dallas, Tex., completed two such river bank projects last year. The two contracts covered 112 river miles at a cost of over $1 million.

The first contract was for $579,000 and covered 48 river miles. Center of the work was about 10 miles upstream from Jefferson City.

Quantities involved included 436,000 cubic yards of earthwork; 74,000 lineal feet of piles; 102,000 tons of stone along pile structures; 67,500 tons of stone in toe trench revetments; and 57,000 tons of stone in stone-fill dike and stone-fill revetments.

Markham & Brown's second contract for $553,000 covered 64 river miles adjoining the first contract.

Quantities included 93,500 cubic yards of earthwork; 65,500 lineal feet of piles; 34,500 tons of stone along pile structures; 102,000 tons of stone in toe trenches and 111,500 tons of stone-fill in dikes and stone-fill revetments.

With a self-cleaning channel, the Missouri will be a changed river carrying its long-sought commercial barge traffic throughout the river season.

To achieve this goal, new methods are replacing old. It should be remembered that the problem of the Corps of Engineers is different for each major river. For example, the revetment work on the Mississippi is not the same as on the Missouri, just as these two rivers show different behavior traits and each has its own brand of stubbornness.

Structures originally used for stabilization work on the Missouri consisted of permeable pile dikes and revetments constructed either with lumber or a willow foundation mattress. These willow structures involved much hand labor

Northwest 2½-yd. 80-D shovel loads at Cote Hill quarry, one of several sources for 480,000 tons of stone for Markham & Brown.

Churn drills operate efficiently in the highly fractured stone formation. Three 20-W churn drills, using 6-in. diameter bits, drill 60-ft. holes at rate of 5 feet per hour.

and required experienced workers who could weave mats.

One of the newer refinements that generally has proved successful is the stone toe trench. It serves as a toe-hold for many of the other types of control structures, such as the stone-fill structures used to shape the channel and in direct stone fills used to untwist a bend.

This type of trench is excavated along the toe of a revetment to a depth below normal low water line. The trench is filled with rock. It prevents undercutting of the upper bank rock pavement from wave action flow of the current. It resists the river when it wants to change its channel.

Stone is also used in wood pile structures, where the piling is driven in the form of a pen. The fill has virtually stopped scouring of the river bed around piles.

Another relatively new control feature being used on the Missouri is the trail revetment, which is similar to a long finger reaching out from the bank to influence the normal current. It is also useful in preventing still water eddies which allow sand to pile up into new sand bars. All the new improvements are based on the theory that an active current in a controlled channel will keep its own nose clean.

Trail revetments are made by excavating a trench below normal low water line similar to a toe trench excavation and filling with stone to above normal river level. They are situated and slanted to perform the special services required by plans.

The new slant toward conquering the whole river instead of revising it on a local or piece-meal basis, contributes much to lasting improvement. Because of the importance of having a clean stabilized channel, the authorized construction gives first priority to work on unsatisfactory channel conditions and bank erosion.

The Missouri River, in its natural state, is a wild, treacherous stream, constantly meandering between rather low, easily erodible banks in numerous small channels separated by continuously shifting sand bars and islands.

The object of channel stabilization is to mold the shapeless unnavigable river into one defined channel of smoothly curved bends. These bends must have

Continued on page 40

(Below) Good breakage makes the limestone easy to load for this 1½-yd. 38-B. (Right) C. C. Kuydendale, dynamite foreman, displays one of the larger types of cartridges he sometimes uses. Usually he uses 5 x 16-in. sticks of Dupont Gelex No. 1.

NORTHWEST

MODEL 2

① A new 25-D handling steel on a Southern bridge job.

② Another of the many 25-D Pullshovels now in service.

③ The 25-D is fast and smooth on clamshell work.

NORTHWEST

NORTHWEST EQUIPMENT IS BUILT IN THE FOLLOWING SIZES

SHOVELS	CRANES	DRAGLINES
¾ Yd. to 2½ Yd. Capacity	15-Ton to 50-Ton Capacity	¾ Yd. to 3 Yd. Capacity

PULLSHOVELS	TRUCK CRANES
¾ Yd. to 2½ Yd. Capacity	25-Ton and 35-Ton Capacity

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A STILL FINER 3/4 YARD MACHINE

25-D

In keeping with Northwest's program of constant refinement Northwest announces a still finer tool —the 25-D, an advanced ¾-yd. machine as a Shovel, Crane, Dragline or Pullshovel supplemented by the Northwest 25-D, 18-ton Lifting Crane. This Northwest will make many new features available.

- New Independent High Speed Worm Boom Hoist
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These are just a part of the new advances in the design of this workhorse of the ¾-yd. field that you can add to the many exclusive features always available on Northwest machines.

Don't buy a ¾-yd. machine without getting the whole story on the 25-D.

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④

③

④ On those rock jobs the 25-D means even greater output.

ASK for complete details on this still finer NORTHWEST!

(Left) A 14-yd. Mack gets its stone load weighed on scale. (Right) A 22-B crane raises and lowers barge ramp used by trucks.

Missouri . . .

Continued from page 37

the proper radii to concentrate the hydraulic energy of the flowing water along concave banks so that the river itself, will, under all conditions and at all points, retain sufficient energy to scour and maintain a channel of the desired depth and width.

Already the work of the Corps of Engineers has paid off because the Missouri River barge season last year, ending Nov. 4, 1958, set a new record of 585,000 tons, double that of the previous year, according to official figures. October set a new monthly high record of 150,000 tons.

Col. Anston D. Marston, acting Missouri River division engineer, said that this record was set for a seven-month season and that an eight-month season would be possible when the upstream reservoirs have reached operating levels and a 9-ft. channel becomes available.

Col. Marston said the most significant improvement last year was the increase in the size of tows to an average of five barges each, with 10 barge tows not unusual, and a few that ran up to 16. This is, of course, a tribute to the improvement of the channel in many places.

Low water in the Missouri has always been a bug-a-boo to navigation, and more than one river captain in the old days has told of coming down the Missouri from Kansas City in his stern wheeler with the big wheel kicking up "dust" behind him. Others have been aground on sand bars during low water and watched the water run out from under them.

Reduction of the many hazards to commercial navigation will soon increase transportation on this river and place operation on the Missouri on a par with other navigable streams. Such are some of the objectives of the work done by contractors.

Fortunately, the problem of locating suitable rock in the quantities required was not a serious problem for Markham & Brown, because there were a number of unused quarries in the 112 miles of the job.

Quarry Setup

One of the quarries used in the first contract was near Tebbets, Mo., where the haul was about a mile to the river. On this portion of the job, Markham & Brown, had two barge-mounted 2-yd. Bucyrus-Erie 44-B draglines excavating river trenches for finger dikes and toe trenches. These old but still usable machines were leased for the job.

Standard methods of blasting, hauling and dumping were used at the quarry known locally as Cote Hill, which is on the north side of the river across and west of Osage City and above where the Osage River empties into the Missouri.

This site, is a long rangy ridge of mostly limestone rock that rises unexplainably out of the wide Missouri bottoms.

Blast hole drilling equipment, consisting of three Bucyrus-Erie 20-W churn rigs, powered with Hercules gasoline engines, was moved to the top of Cote Hill to blast out rock supplies.

Two drills were mounted on K-5 and K-6 International trucks and the third was mounted on a 2-ton Reo truck. C. C. Kuydendale, dynamite foreman, said this was the third time he had set up drilling equipment at this location.

The 20-W's, normally water well drills, made excellent "big hole" blast hole drills in this limestone formation. Each rig swung 4½-in. 900-lb. stems and 6-in. bits for a total of 1,200 to 1,400 pounds on the ⅝-in. cable.

The rigs drilled constantly, operating on three eight-hour shifts. Blast holes averaged slightly over 60 feet deep, with bits running on an average of 30 feet between sharpenings. Bits were sharpened on the job by heating and forging.

Nine holes were drilled in two days by the three rigs, each averaging five feet per hour. While the drilling pattern varied to suit conditions, usual spacing of holes was on either 18-ft. centers or in an 18 by 21-ft. pattern.

Blast holes were normally loaded with 350 pounds of Dupont Gelex No. 1 in 5 x 16-in. cartridges, or Dupont's Red Cross in both 40 and 60% gelatin strengths. This loading resulted in a consistent breakage of about 1,000 tons of rock per hole, so that shooting a round

of nine holes produced between 9,000 and 10,000 tons of rock.

The charges were detonated with regular No. 6 non-delay electric caps, although delays were used when the situation called for them. Primacord connectors were used with an electric blasting machine.

Markham & Brown had two shovels available for loading at Cote Hill. They were a Bucyrus-Erie 38-B, equipped with a 1½-yd. dipper and powered with a Caterpillar D366 diesel, and a 2½-yd. Northwest 80-D powered with a Murphy diesel.

A Cat D7 dozer was used for cleanup in the haul area.

The haul fleet consisted of two 6MC No. 630 diesel end-dumpers hauling 10 yards; two Ford T-800 10-yd. rear-dumps; and a Mack B-63X diesel end-dump hauling 14 yards. In quarries like Cote Hill where no state highways were used and the hauls were short, the trucks were loaded far beyond their rated capacity.

At the river trucks climbed up ramps onto the barges to dump. These ramps had to be raised and lowered when a loaded barge moved out into the river and an empty moved in. A crane stationed on the bank positioned the ramps.

Barge Fleet

Four rock barges were used. Two other barges were assigned as floating bases for a Bucyrus-Erie 37-B dragline and a steam piledriving outfit.

The steel cargo barges handled 350 to 400-ton loads of quarry-run rock dumped by the trucks. This barge fleet provided sufficient capacity, although on some of the longer 10-mile hauls up the river, there was some delay in waiting for empty barges.

By and large the routine of one barge loading, a full one on the way up the river, one barge being unloaded at the dump site and an empty on the way back, worked out efficiently.

Four diesel-powered tugboats pushed the barges. This fleet included the *Dorothy A*, which was powered with two Hercules diesels and employed a rudderless system of steering. This tug was leased from the Allgire Rudderless Tug Boat Co., St. Louis.

Company-owned tugs were the *Bernice* powered with a pair of GM 6-110 diesels; the *Phoebe Jinnette* with a pair of 6-71E diesels; and the *Judy M* with one 6-110 diesel. The Corps of Engineers boat, carrying inspection and supervisory personnel, was the *Iatan* powered with a 6-71 diesel.

All boats and pickup trucks were linked by Motorola two-way radio network.

Barges were unloaded in two ways. When long reach was necessary, the rock was unloaded by the Bucyrus-Erie 37-B dragline with a 60-ft. boom and 1-yd. rock bucket. The 37-B is a veteran of the river and, said to be the oldest in the point of service. It first dipped its bucket in the muddy waters of the Missouri in 1927. It is powered with a D13000 Caterpillar diesel.

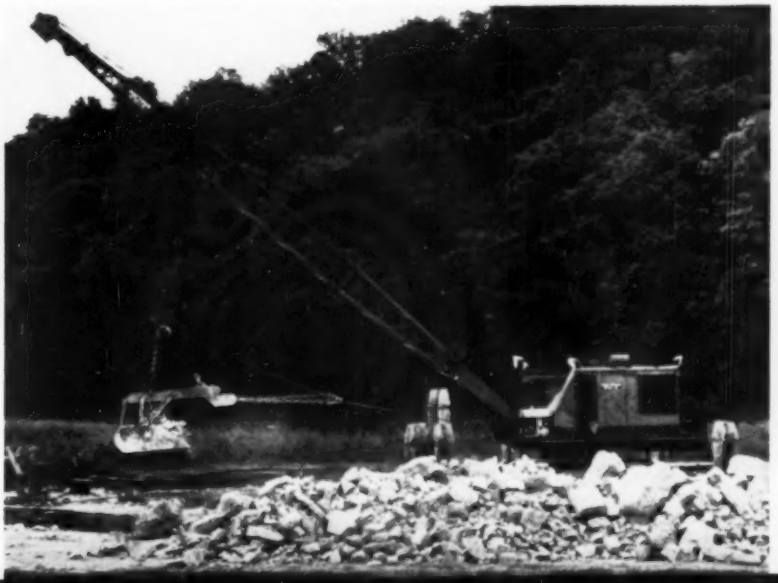
The other method employed two "high lift" tractors. They were a Caterpillar 977 Traxcavator with 2¼-yd. bucket and an Allis-Chalmers HD-11G with 2⅜-yd. bucket.

These machines rode the barges as required to be at the right place for unloading. The high lifts handled their work efficiently. For example, many of the dikes, which were being shored up with rock, consisted of piles that had been driven many years ago. It was necessary to bring the rock into the front side of the structure and to reach over the pile fronts and stringers to deposit the rock on the back side of the dike. The extra reach of the high lifts solved this problem.

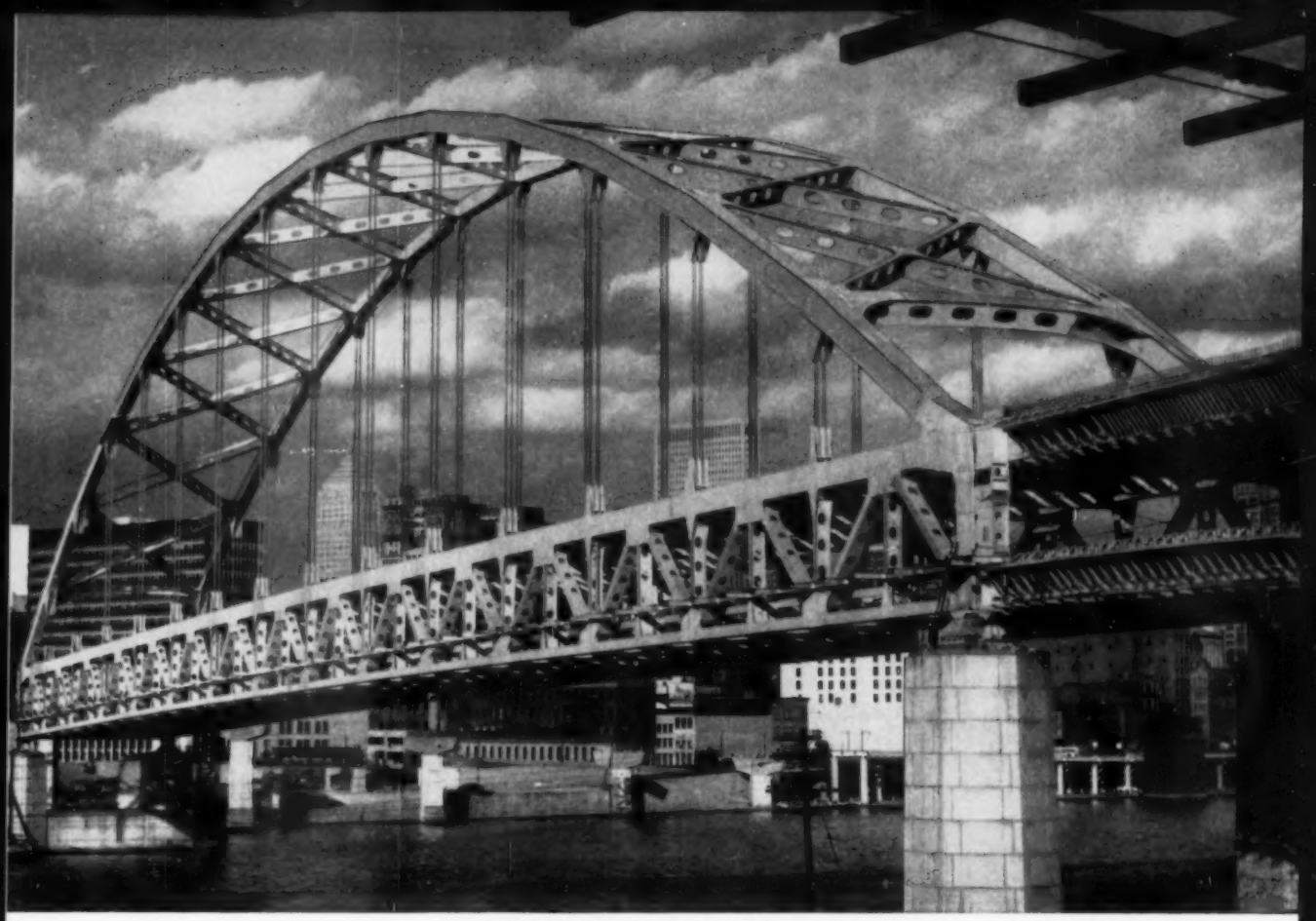
Lewis M. Fisher, general superintendent, was top official for Markham & Brown. L. C. Edgings was rock superintendent.

This is Superintendent Lewis M. Fisher, a veteran of many years on river work.

(Center) Here is a trail revetment, consisting of a stone-filled trench dug in the river bottom and built up above normal river level. (Right) an old but still serviceable 37-B dragline unloads barge, dumping rock around pile clusters with its 1-yd. bucket.



EX-LAFFS GOES UNDERGROUND
YOU PROMISED I COULD DO THE FINAL BREAK-THROUGH THIS TIME!
WHAT FLAVOR?
15% GELATIN DYNAMITE
MASCOT
Tunnel of Love
EXCAVATING ENGINEER
AND THIS TIME— STAY OUT!
INSPECTOR.
JUST LET THE AIR START TO GO BAD AND THAT CANARY IS RIGHT ON THE BALL.
Mann TOWNSEND



New Gateway to the West—This 8-lane bridge at Pittsburgh's Point was designed by Richardson-Gordon and Associates, Pittsburgh, Pa. It combines a steel arch with Tiger Brand Wire Rope suspenders.

USS Tiger Brand—America's No. 1 Wire Rope supports Pittsburgh's new bridge

USS Tiger Brand Wire Rope was used on all the cranes that did the heavy lifting.

THE new double-deck Fort Pitt Bridge spans the Monongahela River and connects the Golden Triangle with a double-deck tunnel under Mt. Washington. This eliminates a serious traffic bottleneck—permits Lincoln and William Penn highway traffic to cross Pittsburgh in half an hour without stopping for traffic lights.

The new bridge is unique in design. It is a double-deck, tied-arch span, 752 feet long. Two 4-lane roadways are supported by 112 prestressed USS Tiger Brand suspender ropes, each 3¼ inches in diameter. A total of 8960 feet of suspender rope was used in the bridge.

Why Tiger Brand is your best buy

1. It is made by a company that maintains the most complete wire rope research and manufacturing facilities in the country.
2. It is designed by one of the country's largest staffs of wire rope engineers. It is serviced by field representatives who will answer any call.
3. Every type of Tiger Brand Wire Rope is designed for specific applications. You get the *right* rope for the job.
4. It is made by one Company, U. S. Steel, and every step of production, from ore to finished product, is carefully controlled and supervised to guarantee *one* high standard of quality.
5. Tiger Brand Wire Rope is manufactured by the largest single producer in the country.

For information, write American Steel & Wire, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS and Tiger Brand are registered trademarks

American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors • United States Steel Export Company, Distributors Abroad

News from the Field

At award ceremony are George F. Ferris (left), president, Raymond International Corp.; J. D. Marshall, executive director, Associated General Contractors of America; Sen. Lyndon Johnson (Dem., Tex.), Senate majority leader; Herman Brown, Brown and Root, Inc.; and Thomas Walsh, Jr., president, Walsh Construction Co.

Contractors Win Navy Award for Overseas Construction

Three American general contracting firms recently received Navy Certificates of Merit at a presentation ceremony in Washington, D. C. for their part in a $322 million program of military construction in Spain. The certificates were presented by Assistant Secretary of the Navy Garrison Norton.

The firms are Brown and Root, Inc., Houston, Tex.; Raymond International Corp., New York City; and Walsh Construction Co., Davenport, Iowa, and New York. All are long-time members of the Associated General Contractors of America.

The three firms formed the joint venture of Brown-Raymond-Walsh, which was selected in January 1954 by the Navy's Bureau of Yards and Docks as contractor for the Spanish bases program, now nearing completion. The combine was originally formed to construct the North Atlantic Treaty Organization headquarters in Paris.

The integrated base system in Spain includes three major U. S. Air Force fighter-bomber bases; supply and communications facilities; a naval air station; and fuel and ammunition storage facilities.

The Bureau of Yards and Docks was designated as the construction agency to carry out the Air Force and Navy construction programs. The construction of these bases is the largest project in the peacetime history of the Bureau.

Look out below! Blasted rock is pushed over a 350-ft. cliff as a road is cut on the site of Cougar Dam in Oregon. J. W. Briggs Construction Co., Portland, is relocating 10½ miles of roads which will be covered by dam embankment and reservoir.

Start Big Rockfill Dam

Cougar Dam, under construction by the Portland (Ore.) District, Corps of Engineers, is located on the south fork of the McKenzie River, 4.4 miles above its mouth.

The $42,900,000 dam will be a rockfill type embankment 1,500 feet long with a maximum height of 445 feet from foundation to crest. A gated spillway will be located in the right abutment. The regulating outlet tunnel and outlet works and power plant will be located at the left abutment.

Bids for construction of the dam, outlet works and power intake works are to be opened June 2. Bids for construction of the powerhouse and installation of powerhouse equipment will be invited in November 1960.

Work to date has consisted of abutment stripping, clearing and road relocation. J. W. Briggs Construction Co., Portland, Ore., is building 10½ miles of new roads, cutting through sheer basalt cliffs to raise an old road along the south fork of the McKenzie River to a

Continued on page 46

NEW SAUERMAN SLACKLINE CABLEWAY INCREASES PRODUCTION OVER 25%

Bucket breaks water with heaping load from a 100 ft. depth...

is conveyed and dumped automatically at surge pile.

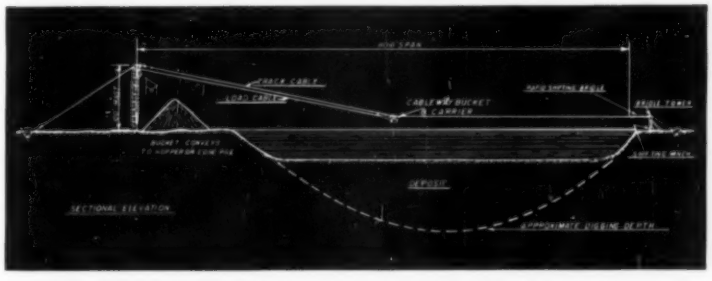
Wherever deep digging is required and operating spans are long, the new Sauerman Slackline is adding to its margin of superiority over other types of excavators. Production increases of over 25% and in some unusual cases as high as 80% are reported.

Not only is production increased but operating costs are lowered as cable and hoist wear is reduced and the machine runs with fewer peak loads and shocks—all possible from a cushioned drive using a torque convertor and other refinements.

These benefits are also available to present owners of slackline cableways. Guaranteed Gravel & Sand Co., a Sauerman Slackline user for over 35 years, has increased hoist speeds from 230 to 350 fpm. on the digging cycle and conveying speed to 800 fpm.—a gain of 25%. Guaranteed's 2-cu. yd. bucket is digging 450 ft. away from the surge pile and delivers 150 cu. yds. per hr.

The Sauerman Method lets you work distant material—up to 1,000 ft. away and dig 100 ft. or more below water. Now more than ever the greater tonnage available through fluid drive operation makes a Sauerman Slackline Cableway the low cost way for deep digging.

Get the best machine for your job. Write to Sauerman for expert advice on any materials handling project. For additional information on slackline cableways, ask for Catalog C.

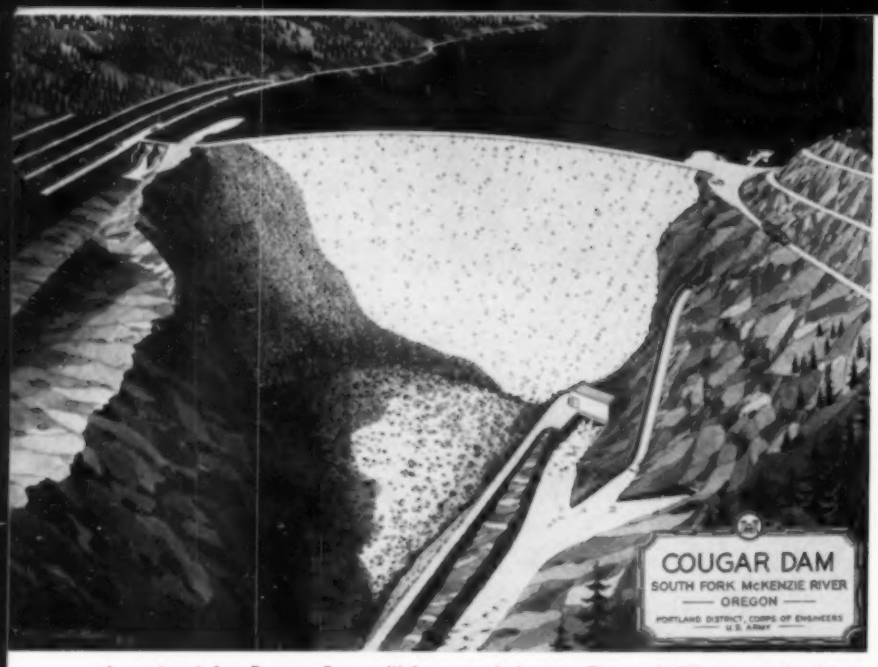


Above drawing was prepared for a specific slackline installation and does not represent maximum spans. Rapid shifting bridle is not needed for many deposits.

Guaranteed Gravel and Sand Co.'s slackline bucket dumps 150 cu. yds. per hr. on surge pile from digging point 450 ft. away.

SAUERMAN BROS. INC. 622 SOUTH 28TH AVENUE • BELLWOOD, ILLINOIS

CRESCENT SCRAPERS • SLACKLINE and TAUTLINE CABLEWAYS • DUROLITE BLOCKS



A contract for Cougar Dam will be awarded soon. The rock fill type embankment will be 445 feet high and 1,500 feet long. Its main purpose will be flood control.

News . . .

Continued from page 44

new site above the dam. Five International TD-24 dozers are being used by Briggs.

The reservoir will provide 155,000 acre-feet of storage for flood control and multiple-purpose use. An additional 10,000 acre-feet of the usable storage will be provided for power production. The project will be operated as a unit of the coordinated reservoir system planned for the Willamette Basin.

The Cougar Dam project area is located within the Willamette National Forest and recreational planning will be accomplished in cooperation with the U. S. Forest Service. Six years will be required for construction. Preliminary work began in 1956.

Cougar Dam is 42 airline miles from Eugene and 96 airline miles from Portland. The drainage area above the dam site is 210 square miles. Its maximum pool reservoir will be 1,280 acres.

The powerhouse will have two generating units with a total installed capacity of 25,000 kilowatts. They are expected to be in operation by December 1962.

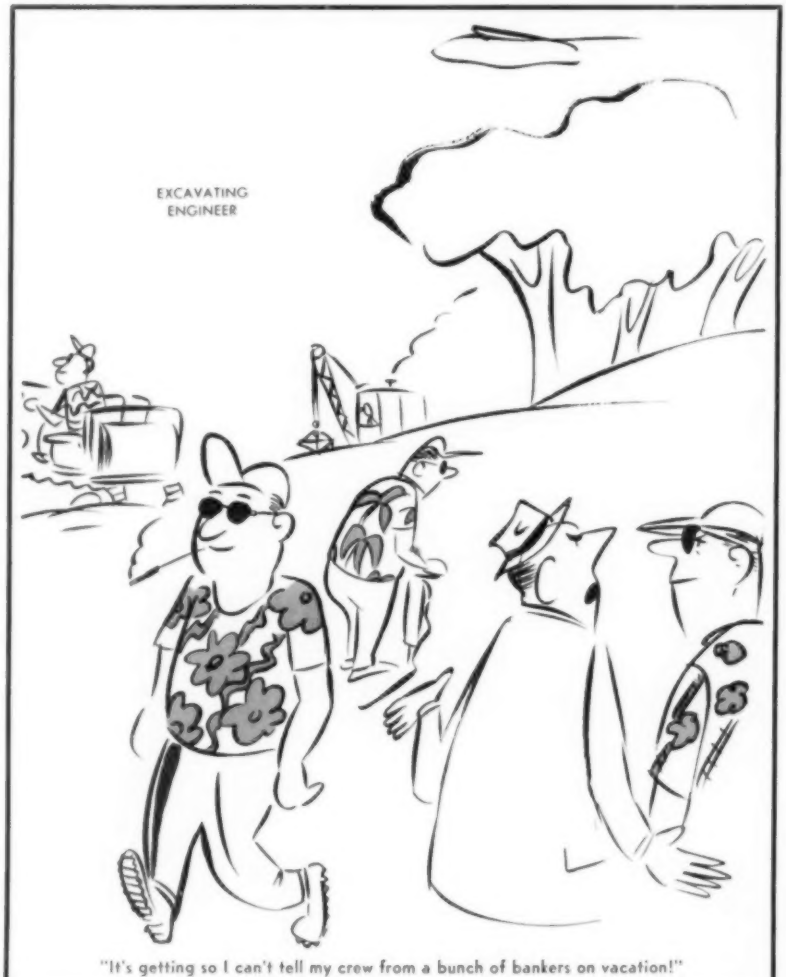
Schedule Coal Show in May

A special session on *Cost Cutting in Open Pit Mining—Industrial Minerals* will be featured on the technical program of the 1959 Coal Show of the American Mining Congress in Cleveland, Ohio. The convention and exposition, running May 11-14, will include a large showing of mining and earthmoving equipment.

Increasing numbers of industrial minerals producers have been attending the Coal Show in recent years to keep up-to-date on mining technology.

In the special cost cutting session, seven speakers will explore new concepts in mining methods and equipment.

Several speakers will tell about the latest developments in *Blasting Wet Holes with Ammonium Nitrate*. C. R. Fahnestock of Caterpillar Tractor Co., Peoria, Ill., will give the results of a study conducted throughout the United States which demonstrates the feasibility of *Determining Overburden Composition with a Simple Seismograph*. A spokesman for U. S. Steel Corp. will tell how *New Steels Can Cut Operating Costs* and a presentation on *Cost Reduction in Quarrying Through Automation* will be delivered by a representa-



"It's getting so I can't tell my crew from a bunch of bankers on vacation!"

tive of the Vulcan Materials Co. A leading quarry operator will talk on *Economics of Various Types of Quarry Haulage.*

Coal men will review technical progress made in the industry and discuss increasing output to meet nearly doubled consumption requirements forecast by 1975.

An industry-wide committee, headed by E. P. Humphrey, Stonega Coke & Coal Co., Philadelphia, Pa., has completed work on a program of technical sessions for the meeting. Topics include mechanical and continuous mining; safety; strip mining; coal preparation; roof support; haulage and power; and management.

ARBA Task Force Reviews Highway Contracting Industry

A task force committee of the American Road Builders' Association is putting the finishing touches on a comprehensive review of contractors' capacity, according to an announcement by Maj. Gen. Louis W. Prentiss, USA (Ret.), executive vice president of the association.

Formal recommendations will soon be submitted to the association's board of directors.

Status of the highway contracting industry was sampled by questionnaires circulated to contractors in all states during 1958. Among the facts developed were these:

Contractor capacity: In 1954, contractors reported that they were operating at only 46.4% of their capacity. By 1957, although the value of road construction by contract had increased over 45%, contractors reported that they worked at only 62% of their estimated capacity, leaving ample room for further expansion.

Delays in period between advertising for bids and start of construction: Contractors felt that normally they should be allowed three weeks for the preparation of bids. On the other hand, they felt that the time elapsing between the opening of bids and the award of contract could be reduced in many instances. It was reported that 83% of the states required from two weeks to three months to make some of their awards. Obtaining rights-of-way and removal of utilities were reported to be the principal causes of delay, in that order. Many cited outmoded procedures as a source of delay and others suggested that much of the paper work could be

Continued on page 48

OWEN

the Greatest Name in Buckets All Over the World

Wherever you go, wherever you see excavating or handling of materials . . . there you will find one or more OWEN Clamshell Buckets on the job. Faith in their performance, confidence in their sturdy construction, and complete assurance in their ability to complete contracts satisfactorily and "on time" . . . these are the reasons that powerful, rugged OWEN Clamshell Buckets dot construction jobs all over the globe.

You'll get more from an OWEN in every way — Longer Life, Larger Loads, More Economical Operation. From drawing board to finished product, OWEN lives up to its great name in every way. Put the real worker on the end of the boom! — get a Great OWEN Clamshell Bucket without delay.

OWEN MATERIAL HANDLING BUCKETS

OWEN'S new center line reeving principle, now incorporated in a completely redesigned line of material handling buckets, is one factor that increases cable life of these buckets up to 75%. A full line now available from ¼ cu. yd. up to 10 cubic yards.

OWEN GRAPPLES

OWEN'S patented independent tine action 4-prong grapple has proven itself invaluable in land clearing operations. Its independent tine action guarantees positive contact and tremendous gripping power on each of the four tines, no matter how irregular the shape of the object may be.

Write us your exact requirements. Remember, OWEN Engineers are at your service. Send for Free Catalog today.

The OWEN BUCKET Co.
BREAKWATER AVENUE, CLEVELAND 2, OHIO
BRANCHES: New York • Philadelphia • Chicago
Berkeley, Calif. • Fort Lauderdale, Fla.

100

News . . .

Continued from page 47

accomplished before, not after, bids were opened.

Final payments: Contractors reported that in 59% of the states the average elasped time between acceptance of the work and final payment was more than 100 days. In three states it was more than 200 days. When asked what they considered a reasonable time, contractors' answers varied from 23 days to 90 days, with the average a little over 47 days.

Asphalt Institute Names East Coast Engineer

Col. Wright Hiatt (U.S.A., Ret.) has been named to the vacant post of managing engineer for the Atlantic-Gulf division of the Asphalt Institute.

Col. Hiatt, with headquarters at New York City, will direct institute engineering activities in 20 coastal and southern states ranging from Maine to Louisiana. He will supervise services at district offices in New York City and Albany, N. Y.; Boston, Mass.; Harrisburg, Pa.; Richmond, Va.; Atlanta, Ga.; Montgomery, Ala.; and New Orleans, La.

He is a native of Winchester, Ind., and was graduated in 1936 from the United States Military Academy. He served 21 years of active duty with the Corps of Engineers. During the later stages of World War II, he constructed and maintained most of the famed Flying Tiger air bases in China, winning promotion to the rank of colonel at the age of 30.

He is a member of the American Society of Civil Engineers.

A new bowling alley in Savannah, Ga., is the scene of this activity as a truck crane and crawler crane owned by Romine Equipment Rental Co., erect steel roof arches.

Jet Dredger

A new dredge which will remove sludge, gravel, building materials and vegetation from underwater without the use of buckets or cutters was demonstrated recently in Britain. Named the Acrow jet dredger, it uses high-pressure water jets to loosen the materials to be dredged. The sludge formed in the process is removed by vacuum pipes up to 1-ft. diameter in size.

No working parts move underwater and there is no sludge pump to become blocked. The complete dredge can be broken down into small sections for transportation over land or by air. Manufacturer is Acrow Engineers, Ltd., South Wharf, London W. 2., England.

British dredge uses high pressure water jets to loosen materials which are removed by vacuum pump. There are no cutters.

Equipment You Ought to Know About

All-Transistor Automatic Blade Control

Manufacturer: Preco, Inc., Department EE, 6300 E. Slauson Ave., Los Angeles 22, Calif.

Claims: Preco has announced a "revolutionary" all-transistor automatic blade control with printed circuitry.

The new automatic blade control is an improvement of the former Preco unit which featured vacuum tubes in its control mechanism. As with the former unit, the operator selects which end of the motor grader blade (usually the heel) he wants under automatic control. He sets the dial of the unit for the desired transverse slope, and can then concentrate all of his attention to the toe of his blade and his reference line. The Preco blade control automatically holds the cutting edge of the blade at the desired transverse slope.

By actual field experience, the use of the blade control has resulted in substantial savings in staking costs; in the amount of machine time necessary to produce the finished grade; in costs of other labor, such as grade checkers; and in the cost of imported materials, as a result of the more accurately graded surface.

The new all-transistor control is considerably faster in action than the original vacuum-tube type. For example, correction of any error in blade position is made while the motor grader has traveled less than six inches. The blade control will hold the transverse slope of the blade to within $\frac{1}{8}$-inch in its entire width, or to an accuracy of $\frac{1}{10}$ of 1%.

Improvements in the Preco "all-transitor" automatic blade control include a re-designed pendulum, as well as an electronic computer assembly employing transistors and printed circuits. These replace hundreds of component parts (such as tubes, vibrators, relays and switches) used in the original unit, as well as scores of wire connections.

Because transistors—the key to such developments as the ballistic missile—are used as the heart of the new design, it is expected that the dependability of the new design will be improved considerably.

The Preco automatic blade control is

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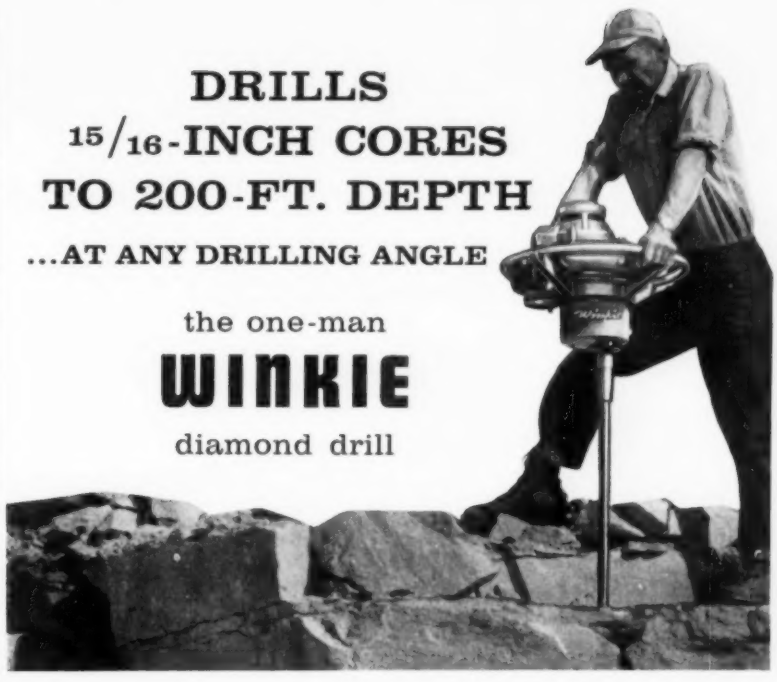
DRILLS
15/16-INCH CORES
TO 200-FT. DEPTH
...AT ANY DRILLING ANGLE

the one-man
WINKIE
diamond drill



So powerful, yet so portable — The new Bucyrus-Erie Winkie diamond drill weighs only 45 pounds, yet even in granite, the Winkie recovers 15/16-inch cores to depths of 200 feet. Maximum core diameter is 8 inches.

Low initial cost — The Winkie sells for half the cost of drills with equal capacity — is not limited to single purpose or a few drilling chores. The Winkie will take on almost any core or structural drilling job, finish it faster . . . cheaper . . . easier.

Lowest operating cost — The Winkie's easy-starting, 2-cycle, 5¼-hp gasoline engine will operate at full throttle, full load on less than a gallon of fuel per hour.

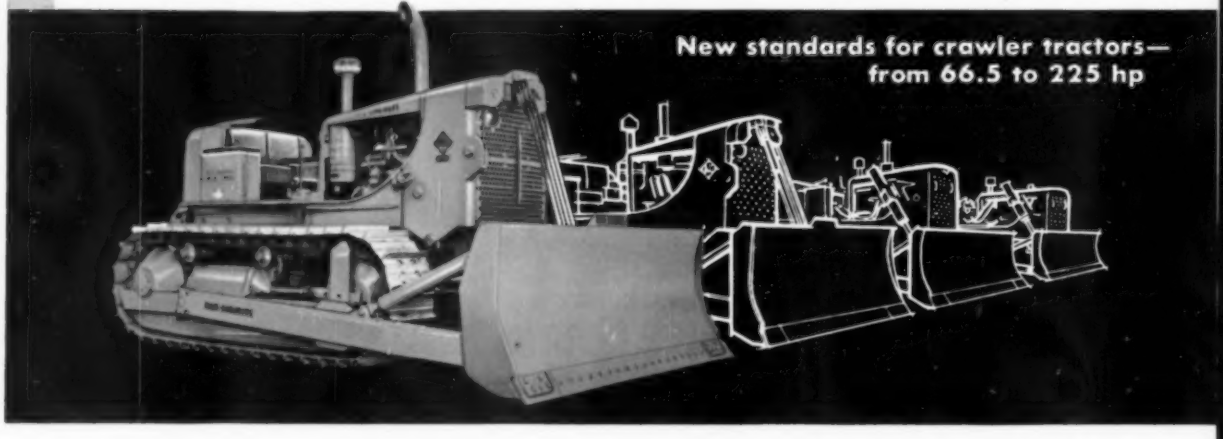
Whatever your job, the Winkie will give you greater footage per shift — for less cost — than any drill of comparable capacity. Write Dept. 21B59, Bucyrus-Erie Company, Drill Division, Richmond, Indiana, for complete details on the amazing big-capacity, lightweight Winkie.

45 lb.
2-cycle, gasoline, air-cooled engine
5¼ hp @ 5000 rpm
Hardened helical transmission gears
Gravity and hand lever feed
Centrifugal clutch
2000 rpm max. bit speed
Height, 19 in., Diameter, 21 in.

BUCYRUS ERIE ®
BUILDS BETTER EQUIPMENT

How to get more tractor for your dollar

Advantage	What it means to you
All-steel main frames	Power train protection Better equipment mounting Better weight distribution
Permanent lubrication of truck wheels, idlers and support rollers	No more wasted time greasing these track components
Torque converter drive	Matches power to load automatically Transmits power smoothly Less shifting
Double reduction final drives	More clearance Longer gear life
True unit construction	Faster service Easier access to all major assemblies



move ahead with ALLIS-CHALMERS

In the chart below are five important crawler tractor advantages. These features have earned recognition by all makers of crawler tractors—one or more are now included in their latest designs. It stands to reason that the more of them you get on your next crawler, the more it is worth to you.

Where you get it
Allis-Chalmers is the only manufacturer offering main frames in *all* models. Two other manufacturers now offer them in one model.
Allis-Chalmers is the only manufacturer offering permanent lubrication of truck wheels, idlers and support rollers on *all* models. One other manufacturer offers permanent lubrication on three models.
Allis-Chalmers pioneered it in crawler tractors in 1940 . . . offers it in two tractor shovel models, two tractor models. All other major manufacturers now offer it as optional equipment in one or more models.
Allis-Chalmers is the only manufacturer offering double reduction final drives on *all* models. One other manufacturer offers it on three models.
Allis-Chalmers is the only manufacturer offering true unit construction in *all* its models. Two other manufacturers now offer modified unit construction in part of their lines.

Here's proof that other manufacturers of crawler tractors have chosen to "follow the leader" with Allis-Chalmers engineering . . . and that your Allis-Chalmers dealer is the man to see for top value in crawler tractors. He'll be glad to demonstrate the model of your choice. It will have more industry-approved advantages than any other unit near its size. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

. . power for a growing world

New Equipment . . .

Continued from page 49

designed exclusively for the Caterpillar No. 12 and No. 112 motor graders. An exchange program is available to enable present owners of the vacuum-tube blade control to convert to the latest all-transistor design.

Trench Drills

Manufacturer: Salem Tool Co., Department EE, Salem, Ohio.

Claims: A complete new line of trench drills permits contractors to drill holes and lay pipe without breaking paving, disturbing the surface or disrupting traffic.

The units have drilled and pushed pipe as far as 250 feet and are limited only by pipe weight and earth or rock formations to be drilled.

In practice, the drill operates in a trench dug to the depth at which the pipe is to be laid. The drill is placed in the trench with a sideboom tractor or a truck-mounted winch. The auger rotates inside the pipe and advances the pipe as the hole is drilled. The auger flights feed the drilled earth back through the pipe. Additional augers and pipe sections are added as the hole is bored and pipe advanced.

The drills use augers 4 inches to 24 inches in diameter and 2 feet to 6 feet in length. All drills have variable hydraulic feed installed in a rigid frame for drilling accuracy.

Model 10-D, the smallest drill, has a separate gasoline power supply unit which is connected to the drill by two 25-ft. hoses with quick-disconnect couplings. The power unit can be operated from the ground or left on the truck. The Salem 10-D may also be operated from any other source capable of furnishing hydraulic power of proper quantity and pressure. It will handle augers up to 10 inches in diameter.

Models 16-TD and 24-TD will handle augers up to 16 and 24 inches in diameter respectively. Power units on these drills are an integral part of the machine and are gasoline operated. Carriage speed of the 16-TD is from zero to 40 feet per minute. Model 24-TD has a speed range of zero to 6.5 feet per minute. Both units have four-speed transmissions and start electrically.

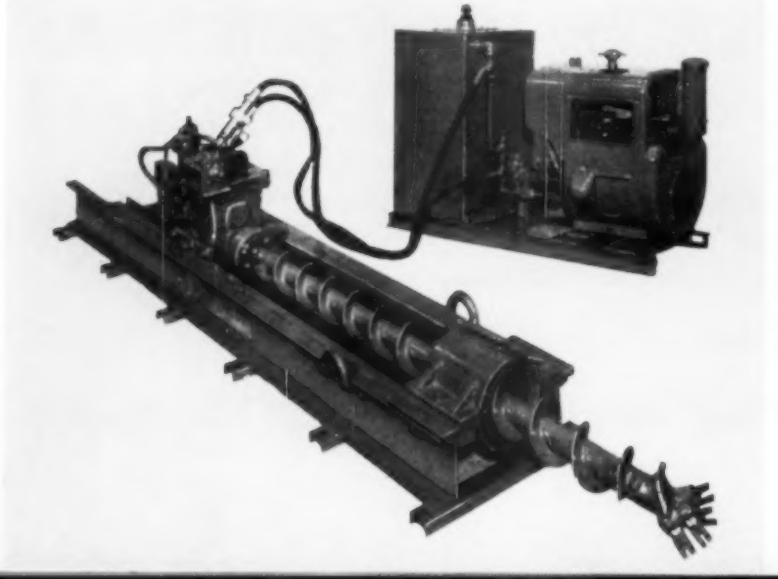
A larger model will handle augers of 36-in. diameter.

¾-Yd. Excavator

Manufacturer: Northwest Engineering Co., Department EE, 135 S. LaSalle St., Chicago, Ill.

Claims: Northwest has announced improvements in its ¾-yd. excavator. The new design includes a new independent worm boom hoist; new power load lowering; longer, wider crawlers; larger drums with greater cable capacity; larger drum brakes and clutches; larger uniform pressure swing clutches; improved Feather-Touch clutch control for easier operation; and grouped lubrication.

The new model will be known as the Northwest 25-D and will be available as a ¾-yd. shovel, standard crane, dragline and pullshovel. It will also be furnished with additional features such as an 18-ton lifting crane.



Motor Grader

Manufacturer: Caterpillar Tractor Co., Department EE, Peoria, Ill.

Claims: The No. 14 motor grader, rated at 150 hp and weighing more than 29,000 pounds, has joined the Caterpillar line as its largest, most powerful motor grader.

The new machine is designed with a practical physical size and weight to tailor it specifically for those jobs where high motor grader productivity is required.

Use of 10-in. rims for the 14.00 x 24 tires provides a wide rim base thus straightening side walls and reducing any side-rolling tendencies. Height of the 12-ft. moldboard is 27 inches, as compared to 24 inches on the current No. 12. Of the machine's total 29,280-lb. weight, 22,270 pounds rest on the drive wheels where it can be used, giving the unit the traction to fully utilize its large size and power.

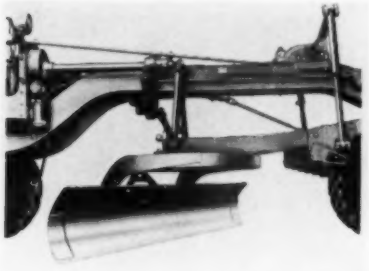
Power for the No. 14 Series B motor grader is provided by a turbo-charged engine rated at 150 hp, which has an 18% torque rise—extremely high for this classification of machine. This engine is the first motor grader power unit ever to be equipped with a turbocharger.

The engine is coupled with a highly-efficient transmission to provide usable maximum power to the drive wheels. The transmission provides six forward and two reverse speeds. Forward speeds range from 2.6 mph in first gear, to 21.6 mph in sixth.

To assure accurate and versatile work, the complete range of blade positions common to all Caterpillar graders has been retained on the No. 14. Vertical lift of the blade is 17¼ inches, with a circle side shaft of 37⅛ inches to the right; 40¼ inches to the left. Maximum bank cutting angle of 90° is a retained feature.

Fine blading control is especially pro-

vided for on the No. 14 motor grader by the availability of a new, faster, fully-transistorized Preco blade control. In addition to the increased response-speed of this control unit, the transistorized circuits make it more durable and capable of withstanding the rigors of extreme applications.



In addition to the Preco blade control, Caterpillar is making available, as optional equipment, an 11-tooth scarifier designed for heavy-duty work in hard material. Especially designed for service with the No. 14, this scarifier has replaceable tips for low repair cost.

Attachments for general road work include push plate, road widener, elevating grader and bulldozer. For snow work, the snow blower, plow and wing are available.

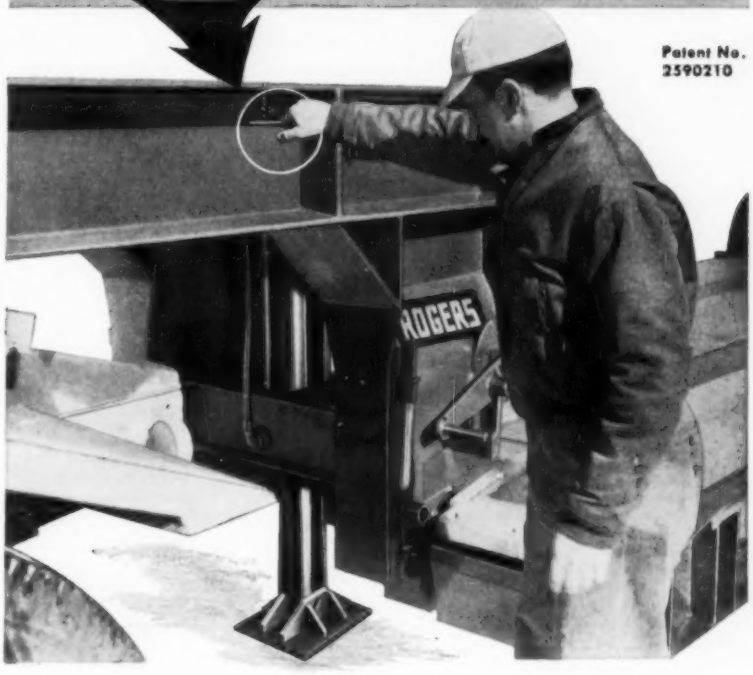
Sand, Gravel Bucket

Manufacturer: Page Engineering Co., Department EE, Chicago 38, Ill.

Claims: A new line of Page dragline buckets is designed specifically for the sand, gravel and quarrying fields. The new design features a longer and higher basket that carries out more pay load on every swing. The dotted lines on the photo below show the added capacity that is built into the new line. To utilize the advantages of the higher and longer basket, the new buckets use a shorter dump rope that throws the front of the bucket sharply back when hoisting to prevent spillage of material. The new sand and gravel bucket is advantageous in underwater digging where the material has a natural tendency to flow

Continued on page 54

fingers on . . .
the PULSE of PERFORMANCE



And it is positive performance made possible by the Patented Hydraulic gooseneck jack and obtainable only on the

ROGERS DETACHABLE GOOSENECK Hydraulically Operated THPG HYDRAU-LIFT TRAILER

PULL THE LEVER. The gooseneck lowers for detachment or to travel with lowered deck to gain greater overhead clearance of high loads.

PUSH THE LEVER. The deck raises above normal position to obtain these advantages:

(1) To gain clearance to pass over embankments.

(2) Put blocking under overhanging loads—then lower the frame, detach the gooseneck and pull away.

(3) To use blocking for a fulcrum and raise the rear of trailer for easy servicing of tires.

Operators tell us this is the fastest and most reliable detachable gooseneck trailer in the field.

Get the literature and the complete story.

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TRIAL SAMPLES

Of World-Famous WHITMORE'S Lubricants NOW IN AEROSOL SPRAY-ON CANS!

HANDI-LUBE LIQUID GEAR COMPOSITION

For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal—no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300%—special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

- Open Gears, Dipper Sticks, Cams
- Enclosed Gear Cases
- Wire Rope and Cable
- Hydraulic Units, Torque Converters
- Roller, Ball, and Sleeve Bearings
- Speed Reducers

Est. 1893

THE WHITMORE MANUFACTURING CO.

LUBRICATING ENGINEERS

CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

New Equipment . . .

Continued from page 53

with the water in a direct line from the rear top of the basket to the lip.

An added feature in the new line is the USS T-1 steel construction. T-1 steel, which has more than three times the strength of ordinary steel, offers the user greater life and less repair and maintenance. It is extremely abrasion-resistant and is ideally suited for sand and gravel digging.

The new line is available with or without perforations in sizes from ½-yd. up.

Diesel Engines

Manufacturer: International Harvester Co., Department EE, 180 N. Michigan Ave., Chicago 1, Ill.

Claims: The International line of power units has been augmented with four new diesel models. The new power units have been designated the UD-554, UD-370, UD-282 and UD-236.

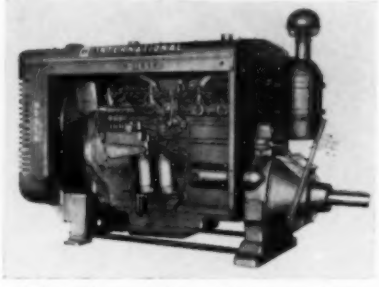
The six cylinder UD-554 offers 121 net hp at 1,800 rpm, and the four-cylinder UD-370, 80 net hp at the same rpm.

New aluminum alloy pistons with chrome-plated top rings give the UD-554 and the UD-370 a 16.5 to 1 compression ratio for fast compression ignition and excellent fuel economy. Better oil control and improved power sealing for higher speed operation are provided by five piston rings, all of them above the piston pin.

Uniform heat dissipation is achieved through new type cylinder heads with improved coolant flow. The efficient overhead valves have positive rotators on both intake and exhaust to keep stems and seats free of troublesome deposits for long valve life.

The UD-554 has six 4⅝ x 5½ cylinders, with a fully counterbalanced seven-bearing crankshaft and torsional vibration damper for smooth, dependable performance. The UD-370 has four 4⅝ x 5½ cylinders, with a fully counterbalanced five-bearing crankshaft, and a gear-driven eccentric weight-type balancer for six-cylinder smoothness with four-cylinder economy.

Both engines have many interchangeable parts, among them cylinder sleeves, pistons, connecting rods and injectors. Dependable, all-weather push-button starting is an extra advantage for use in such machines as ¾ to 1¼-yd. shovels; medium and heavy-duty motor graders; 50 and 75-KW maximum output generators; 250 and 400-cfm air compressors (1,800 rpm); drainage pumps; heavy-duty road rollers; and medium and heavy-duty ditchers and trenchers.



The other members of the new International diesel power unit quartet— the UD-282 and UD-236—are six-cylinder, direct-start models. Both engines have the same $3\frac{11}{16}$-in. bore, with the difference lying in the longer 4.39-in. stroke of the UD-282 over the $3\frac{11}{16}$-in. stroke of the UD-236.

The diesels develop 85 net hp at 2,400 rpm, in the case of the UD-282, and 65 net hp at the same rpm for the UD-236. The ability to operate continuously at 2,400 rpm makes these diesels ideal for direct-connection to low-cost, high-capacity centrifugal pumps used for drainage.

Direct electric starting also makes the UD-282 and UD-236 extremely serviceable for 30 and 40-KW 1,800-rpm, 60-cycle, AC generator sets.

Hydraulic Tractors

Manufacturer: Eimco Corp., Department EE, P.O. Box 300, Salt Lake City 4, Utah.

Claims: New model number designations have been assigned to machines in the Eimco 105 crawler tractor series.

According to Eimco's president, Joseph Rosenblatt, the company decided to give separate model numbers to these machines because they are not simply "attachments" hung onto the basic 105

tractor unit, but are designed for specific jobs.

Individual engineering and manufacturing techniques are required to equip each of the models for specialty use. All models feature torque converter transmission and high quality construction.

Models will be designated as follows: model 105, tractor-excavator, dozer and excavator-dozer combination; model 115, steel mill excavator; model 125, front end loader and fork lift; and model 135, steel mill front-end loader.

In addition to crawler tractors, Eimco manufactures underground mining machinery and is active in the filtration and processing industries.

Truck-Mounted Batch Plants

Manufacturer: Erie Strayer Co., Department EE, Erie, Pa.

Claims: Erie Strayer's new TPA-TPC portable is designed to answer the need for fast, low-cost truck mixer batching plants for highway, bridge and other construction distant from central plants. The new model practically eliminates distance hauling. It's a job-site plant, operating either on gas or electricity, and it can be moved easily to keep up with progress on the job.

Set-up time for the plant is only three hours. Units of the plant are mounted on rubber tires and are moved with two truck-tractors. All conveying and batching equipment is permanently attached. Nothing is removed either for transit or operation.

Wheels do not have to be dismounted when the unit is set up and no poured foundations are required. The TPA-TPC comes equipped with bases that work well in ordinary soil.

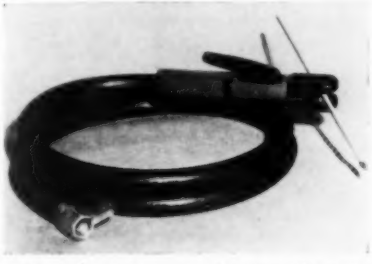
In the TPC automatic, both charging and discharging valves are air operated. The charging valve is equipped with an electric eye for preliminary and final cutoff. Inching control is included on the discharge valve. When the start button is pushed, the cement is weighed and the fill valve closes automatically at the exact weight desired. The cement is discharged from the batcher by pushing the discharge button.

Erie also offers an undertrack screw for auxiliary silo and railroad siding operation. Additional optional equipment includes autographic recorder; bin extensions for increasing aggregate capacity; water storage tank; admixture dispenser; and auxiliary water pump.

Capacity for the new model is 60 cubic yards per hour with 3-yd. batches. The three-compartment bin capacity is 28 yards heaped. Cement storage silo holds 175 barrels; auxiliary capacity is 450 barrels.

Erie's TPA-TPC portable meets specifications of various state highway departments and has the Corps of Engineers' approval.

Arcair Torch



Manufacturer: Arcair Co., Department EE, 458 S. Mt. Pleasant Ave., Lancaster, Ohio.

Claims: Designed for cutomers who have only intermittent applications and for light uses of the Arcair process, the new model H-2 is the smallest manually operated Arcair torch. One of its features is a positive air control valve in the torch handle. By holding the air

Continued on page 56

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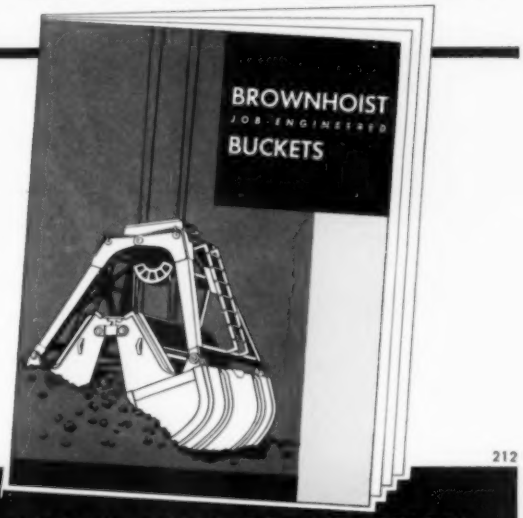
write for your copy of this 24-page illustrated catalog today

Capacities from ½ cu. yd. to 400 cu. ft.



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It's the lot of a Caterpillar Dealer, one of over 300 in the U. S., offering you the best buys in used equipment!

No matter what you want in used equipment, no matter what the price range, your Caterpillar Dealer is headquarters for your best buy. No other dealer offers you "buys" with this protection:

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1 **A "BONDED BUY"** up to $10,000 on used Cat-built equipment—your guaranteed assurance of satisfactory performance on *all* parts of the machine during the guarantee period.

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CATERPILLAR

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BEST BUYS IN NEW AND USED EQUIPMENT

New Equipment . . .

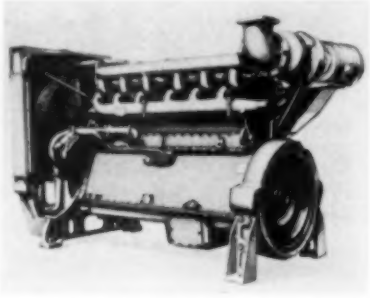
Continued from page 55

orifice in the head of the H-2 within 4 inches of the work, the operator can work with as low as 40 psi compressed air. This is exactly half of the required minimum air pressure used by the larger models.

Lower air requirements are a definite advantage for owners of small shops. Most do not have compressors as large as those found in industrial plants. With the H-2 on the market, small shops can also use the process.

Typical users of this size torch are garages; sheet metal shops; stone quarries; sand and gravel companies; and small welding shops.

Turbocharged Engine



Manufacturer: Engine Div., Department EE, Caterpillar Tractor Co., Peoria, Ill.

Claims: A new and higher output Caterpillar D342 diesel engine has been announced by the Engine Division. It will carry the suffix Series C.

Addition of a turbocharger makes possible the increased rating. Naturally-aspirated versions of the D342 engine have been widely used to power excavators, batch plants, rock crushers and the Caterpillar D8 tractor.

Intermittent horsepower rating of the new engine without fan is 260 bhp at 1,300 rpm.

The Series C electric set version develops a continuous rating of 150 kw, 187 kva, 3-phase, 60 cycles at 1,200 rpm, with available voltage arrangements from 120 to 2,400.

A new Twin Disc MG512 reverse and reduction gear is available on the marine version with 2 to 1 or 3 to 1 ratio. Continuous rating for the marine version is listed at 220 hp at 1,225 rpm, both forward and reverse.

The above ratings are a general guide for a broad range of applications. Other ratings, yielding gains in performance and economic returns, are available to meet the requirements of particular applications.

The D342 Series C features a four-cycle design and individually-pumped single orifice fuel injection valves similar to all other Cat engines. Complete simplicity of operation and parts replacement, with no balancing required, is claimed for this fuel system. Precombustion chambers provide complete and efficient burning of low-cost fuels. The new turbocharger helps convert exhaust energy into added power. A dry-type air cleaner is furnished as standard equipment and is capable of removing 99.8% of dust particles from air entering the engine.

A prominent generator feature is a top-mounted, oversized exciter which provides outstanding motor starting ability for the generator. The voltage level is held within 3½% variation of the rated voltage from no load to full load.

Each of the engine versions has a lower profile and new compactness to simplify installation.

Ready-Mix Trucks

Manufacturer: Four Wheel Drive Auto Co., Department EE, Clintonville, Wis.

Claims: Two new ready-mix concrete trucks, one with an extra-heavy front axle have been announced by Four Wheel Drive.

The new models are designed to meet special weight restrictions.

The new C6-547 is a 54,000-lb. gross vehicle rated truck with an 18,000-lb. front axle and rear tandem axles rated at 36,000 pounds. The truck is designed to carry maximum legal loads in areas which permit upwards of 49,000 pounds

Continued on page 58

"If you're going to play, Clyde, get down here on the blanket with the rest of us."

CATERPILLAR'S PROJECT PAYDIRT

PROJECT PAYDIRT* *pays off for V. R. Dennis Construction Co., San Diego, Calif.*

"Our new DW20's power and easy loading give more yardage"

NEW FROM CATERPILLAR

NEW DW20
Series G Tractor

New HP—345 (maximum)—increased 8%
New Rimpull—39,565 lb. (maximum)—increased 12%
New Speeds—increased rimpull—provides up to 20% faster travel speeds under normal haul road conditions.

NEW No. 482
Series B
LOWBOWL Scraper

New Capacity—24 cu. yd. (struck rating)
34 cu. yd. (heaped rating)

NEW No. 456
Series B
LOWBOWL Scraper

New Capacity—19.5 cu. yd. (struck rating)
27 cu. yd. (heaped rating)

NEW DW21
Series G Tractor

New HP—345 (maximum)—increased 8%
New Rimpull—49,100 lb. (maximum)—increased 12%
New Speeds—increased rimpull—provides up to 20% faster travel speeds under normal haul road conditions.

NEW No. 470
Series B Scraper

New Capacity—19.5 cu. yd. (struck rating)
27 cu. yd. (heaped rating)

Faster cycles, greater production, more profit . . . you get all three with the new Cat DW20 . . . plus Caterpillar reliability.

Dennis Construction Co. uses three new DW20s, Series G, with No. 482 LOWBOWL Scrapers to stockpile sand for a concrete and asphalt batch plant. Speed, power and ease of loading are big factors in increased production. The DW20s carry an average of 32 cu. yd. of sand over a 1½-mile round trip in 7½ minutes. This includes loading and unloading.

Dennis bought Cat equipment because it met their requirements in the past. "Long life and durability are big features we find in all Cat equipment. Dealer service has always been tops," says superintendent Pete McFarland.

Both the DW20 four-wheel tractor and two-wheel DW21 have been given major improvements. Additional new features in the tractors include stronger final drive gears, and a new turbocharger. The 345 HP Cat Diesel Engine in each tractor produces torque rise unequaled in the earthmoving industry. Scrapers have stronger bowls, push frames and aprons.

These modern, heavy-duty rigs enable you to move more dirt at the lowest cost per yard. Get complete facts on the new DW20, DW21 and other new Caterpillar machines all powered-up by Project Paydirt. Call your Caterpillar Dealer today. Set the time and place for a demonstration.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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BORN OF RESEARCH . . .
PROVED IN THE FIELD

***PROJECT PAYDIRT:** Caterpillar's multimillion-dollar research and development program — to meet the challenge of the greatest construction era in history with the most productive earthmoving machines ever developed.

FOR 50 YEARS...
Finest in the Field!
Rely on the bucket contractors rely on. The Omaha Dragline Bucket gives full load with every cast. Perfect balance makes it easy to spot dump. Alloy steel cutting teeth stay sharp, tough and ready.
Strike pay dirt now!
Complete information and specifications await your letter.
DRAKE-WILLIAMS MOUNT
• OMAHA, NEBR.
OMAHA
DRAGLINE BUCKETS

New Equipment . . .

Continued from page 56

gross vehicle weight on a three-axle truck but where weight on the two rear axles combined is limited to 32,000 pounds.

To provide extra flotation of the heavy front axle load in off-highway

use, the two front wheels of the C6-547 are equipped with 14.00x20-in. tires. The rear tires are 10.00x20-in.

Available with either conventional or tilt-cab, the C6-547 is equipped with an RD-501 six-cylinder, valve-in-hand, 212-hp engine.

The other new truck, model C6-405, is designed to carry maximum legal loads in areas where the legal GVW is limited to 42,000 to 44,000 pounds and where 32,000-lb. loads on the tandem rear axles are permitted. Equipped with a 5-yd. mixer, the C6-405 will scale legally with 5 to 5½-yd. loads in such areas.

GVW of the truck is 44,000 pounds —12,000 pounds on the front axle, 32,000 pounds on the rear tandem. Standard tires are 9.00x20-in. with other sizes optional.

Power plant in the C6-405 is an RD-406 six-cylinder, valve-in-head 175-hp gas engine.

Both new models are six-wheel-drive trucks, equipped with FWD's power-proportioning center differential, which distributes one-fifth of the engine torque to the front axle and two-fifths to each of the two rear axles. The trucks have five-speed transmissions and two-speed transfer cases, giving them 10 forward speeds and two reverse.

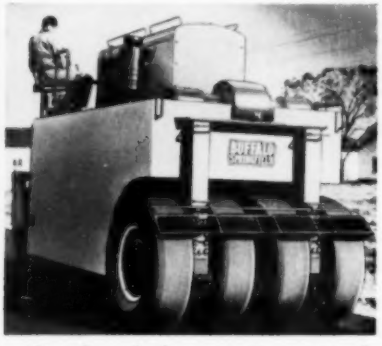
Pneumatic-Tire Roller

Manufacturer: Buffalo-Springfield Roller Co., Department EE, Springfield, Ohio.

Claims: Compaction of sub-base, base and asphaltic concrete courses are a few of the job applications of Buffalo-Springfield's self-propelled pneumatic tire roller. The 10 to 30-ton seven-wheel unit, designated the model PSR-30, also is recommended for compaction of embankments for highways, airport runways, dams and building sites.

A special transmission, including torque converter, offers three speed ratios and an infinite range of rolling speeds up to 19.4 mph—forward and reverse. Speed shifting and reversing clutches are hydraulic actuated.

The four drive wheels of the model PSR-30 are driven through two propeller shafts running from the differential case to a final drive gear case on each wheel pair. Power is obtained from a 125-hp Cummins diesel engine.



Complete dual operating controls include automotive type, hydraulic power steering. Right and left hand operator seats are adjustable, can swivel 360° and can be locked at 90° increments. Engine controls and instruments are located on the engine hood, convenient to the operator. Both steering and drive wheels are visible to the operator from either operator position.

Two braking systems for service and parking are a safety feature. Each of the four drive wheels have double-shoe type, self-energizing brakes. The brakes are hydraulically actuated through air booster by means of a foot pedal control. The parking brake is a double-shoe, mechanical type on the transmission output shaft controlled by a hand lever with a ratchet lock.

By varying the type and amount of ballast, wheel loads from 3,340 to 8,600 pounds per wheel can be obtained. All wheels oscillate—the drive wheels in pairs and steering wheels through center-pivoted yoke—to give maximum compaction to all materials regardless of grade contour.

Tires are 13.00 x 24, 18-ply, and are available with either smooth or block treads. Other optional equipment includes a 140-gallon sprinkler system complete with cocoa mats for all wheels, and electric lights.

Two Insley Model L's—a ¾-yd. hoe (right) and a crane (above) trench and place a 27-in. branch storm pipe. The sandy soil requires well-points to draw off water.

Meads . . .

Continued from page 31

30-B hoe, Walter the F&H clamshell and Howard the TD-18 dozer. Father Wayne was busy visiting various stations. Ralph and Harold were on other jobs and brother Dean was at home bringing in crops from the family farm.

The Meads generally followed a daily routine on this job that began with the laying of 30 to 40 feet of sanitary and storm pipe and was followed by stripping, ditching and backfilling in the afternoon.

First task for the 30-B hoe was to strip the asphalt road surface and load it to trucks for dispatch to the dump site. Then Edward would begin actual ditching with the 1¼-yd. dipper. He loaded the sand into the trucks, which would be driven approximately 100 feet and unloaded into the section of ditch of jointed and sealed pipe. This was easy digging for the 30-B, and Edward had no trouble keeping ahead of the trucks.

Placement of the pipe—4-ft. lengths of sanitary and 6-ft. lengths of storm—was handled by the 30-B crane. It had a 40-ft. boom. Backfill was placed by the ½-yd. 255-A clamshell. The TD-18 dozer spread backfill deposited by the dump trucks.

Before the 30-B crane arrived on the job, the 30-B hoe itself lowered the big storm pipe sections weighing 14,700 pounds each, into the 20-ft. trench it had dug. Although this weight is an exceptionally heavy load for a hoe, the 30-B handled the job successfully for several days.

Thor and I-R tampers, with air supplied by a LeRoi 400 and an Ingersoll-Rand K-105 compressor, were used to tamp backfill.

The two Insley L's were used to ditch for and place 690 feet of 27-in. branch storm line.

A former stationary dragline which the Meads had converted into a truck crane was utilized to handle manhole sections.

The Meads worked a 10-hour shift on the Michigan State job. They believe in getting things done—much of it through their own labor.

An Adams 512 motor grader patrols the route of the sewer after backfilling.

NOT in the Contract

The efficiency expert went in to see the boss about his vacation. A few moments later he returned with a hound-dog expression on his face.

Asked what was wrong, he replied sourly:

"I only get one week. The boss said I'm so efficient I can have as much fun in one week as the average person has in two."

Baseball idol: "I'll endorse your cigarettes for $100,000."

Ad man: "I'll see you inhale first."

Mr. Bingle was complaining to Mr. Grump about his domestic difficulties.

"I can't live with my wife any longer," cried Mr. Bingle. "She wants to keep a goat in our bedroom."

"Well," said Mr. Grump, trying to be helpful. "I wouldn't let that upset me. Just open the windows."

"What!" exclaimed Mr. Bingle. "And let my pigeons fly out?"

An artist, painting the desert landscape in New Mexico one evening, became aware of an old prospector peeking over his shoulder.

"Welcome, welcome," cried the artist enthusiastically. "I see you too, are a lover of nature. I'm sure you, too, have seen the splash of splendor when the sun goes down; you know what it is when morning gilds the sky. You have seen, too, the hidden beauties that lurk behind the cliffs and rocky rims, turning the golden west into a vast lake of fire! Haven't you, my friend?"

The old prospector shook his head emphatically. "Heck no, mister, I ain't had a drink in nigh onto six years."

"He paid me $50 to dig it. Said something about making a hole in one for once in his life."

The nurse entered the professor's room and said softly, "It's a boy, sir."

The professor looked up: "Well, what does he want?"

The young couple was very much in love, and obviously the railroad station was the only place they could find to demonstrate their affection. Whenever a train was due to depart, they hurried over to the gate and enjoyed a long and fond embrace, as though one of them was seeing the other off for the last time.

A sympathetic redcap, watching their performance, finally came up to them and suggested:

"Why don't you go across to the bus terminal? One leaves there every two minutes."

Two inmates were talking "I've made up my mind," blurted one suddenly. "Tomorrow I order my legions to invade England. History will never say that Julius Caesar faltered in pursuing the Britannic campaigns."

"England, eh?" mused the other, "Well, Julius, if I were you . . . and, incidentally, I am. . . ."

It was obvious that the boss' new secretary had been hired for her looks. At noon, she was observed in the corner drug store restaurant. Dropping the menu, she looked up at the waiter.

"Will it be permissible for me to eat the 'Business Man's Lunch'?"

A temperance lecturer was expounding his subject: "Who has the most money to spend?" he cried. "Who drives the biggest car? . . . The saloon keeper! Who has the finest fur coat? . . . the saloon keeper's wife! And who pays for all this? . . . You do, my friends, you do!"

Several days later a man and his wife who had been in the audience stopped the lecturer on the street and thanked him for the good advice received from the lecture.

"I'm glad indeed that you've given up drink," said the speaker.

"Well, it wasn't that," ventured the man. "We bought ourselves a saloon."

Little boy: "What do you repair shoes with?"

Cobbler: "Hide."

Little boy: "Why should I hide?"

Cobbler: "Hide. Hide. The cow's outside."

Little boy: "So what? Who the hell's afraid of a cow?"

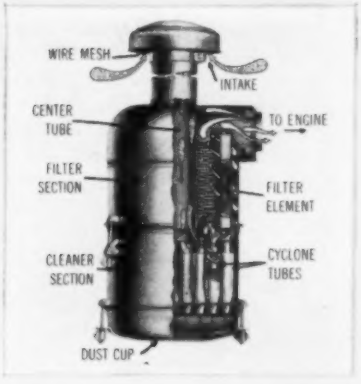
SPECIAL REPORT TO CATERPILLAR OWNERS:

CAT CATERPILLAR

Parts you can trust. Dependable round-the-clock service

New Caterpillar dry-type air cleaner: CUTS SERVICING TIME 75% AVAILABLE FOR FIELD INSTALLATION on D8, D9, DW20, DW21 and No. 583

AIR-BORNE DUST is the deadly enemy of your engine's vital parts. Now, the new Cat dry-type cleaner gives positive protection against the entrance of harmful dirt—and its simplified servicing requires only about 5 minutes instead of 20 as with the oil-bath type!



THE NEW CATERPILLAR DRY-TYPE AIR CLEANER removes 99.8% of the air-borne dust from the intake air, even under the most severe conditions. Air enters through the stack cap where wire mesh screens out leaves and similar trash. Then the air passes down the center tube and swirls down the cyclone tubes. Centrifugal action throws the dirt against the sides of the tubes. From here 95% of the dirt falls through the funnel section into the dust cup, and the relatively clean air passes on to the resin-impregnated, cellulose filter. This element removes the rest of dirt and allows only clean air to enter the intake manifold. Filter elements can be cleaned and have lasted 3,000 hours without loss of efficiency.

SERVICE COSTS ARE SLASHED! Here is the experience of WEGCO Equipment Rental, Inc. of Cleveland, N. C., as told by the Superintendent of Maintenance, Mr. George R. Bell, "The dry-type cleaner saves us money. We have to clean our air cleaners daily because of dusty conditions. The oil-bath cleaners take about 20 minutes to clean and 5 quarts of oil. That's 60 cents in labor and $1.28 worth of oil, a total of $1.88 per machine. This dry-type cleaner takes only 5 minutes to service—about 15 cents labor. It saves us $1.73 on each machine every day."

SERVICE TIP: To empty dry-type cleaner dust cup, simply loosen wing nuts, remove cup, empty and replace. Occasionally the filter element will need cleaning. Merely remove it, blow off dust or wash in water, then replace.

YOUR CATERPILLAR DEALER has the full story on how much *you* can save by changing to the new and efficient Cat dry-type air cleaner. Remember, he stands behind every part he sells. See him today!

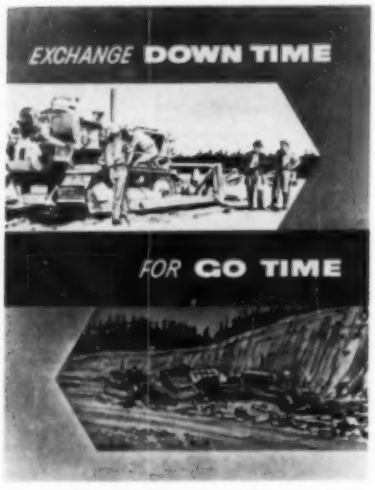
Caterpillar Tractor Co., Peoria, Illinois, U.S.A. **CATERPILLAR**

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

New Trade Literature

Subject: **Parts Program**

Content: The parts exchange program of Caterpillar dealers is explained in an eight-page booklet, *Exchange Down Time for Go Time*. With cartoon type illustrations, the three-color booklet points up the advantages of the dealer exchange program, espe-



cially in regard to time necessary to get a machine back on the job through replacement of assemblies with dealer-rebuilt units. Following the exchanged part through the rebuilding procedure, the booklet shows how each component is inspected for possible re-use or replacement by factory-trained personnel. The machine owner pays only for necessary new parts and labor required to bring the worn assembly back to first-class working condition, the booklet points out. Ask for booklet D848.

Where to get: Caterpillar dealers or Advertising Div., Department EE, Caterpillar Tractor Co., Peoria, Ill.

Subject: **Engineering Handbook**

Content: McGraw-Hill has published a fourth edition of *Civil Engineering Handbook*. This revision of a well known work presents essential theory standards, practice and data for solving specific problems in civil engineering. The 1,174-page handbook was written by a number of authorities and gives rules, principles, working methods and engineering pointers. The experts cover mechanics of materials, stresses in framed structures, steel design, highway and airport engineering, water supply, sewage disposal and other aspects of civil engineering. Editor-in-chief is Leonard C. Urquhart of Porter, Urquhart, McCreary & O'Brien. The fourth edition reflects many revisions that bring it up to date and in line with current practice. New and expanded material appears on such topics as photogrammetric surveying; interstate highway system requirements; soil classification; flow in pipes and channels; stresses in continuous beams and frames; welded steel construction; and mixtures of concrete materials for air entrainment. The book is a useful working tool in the library of civil engineers and others in related areas of work. Price is $17.50.

Where to get: McGraw-Hill Book Co., Inc., Department EE, 330 W. 42nd St., New York 36, N. Y.

Subject: **27-Ton Rear-Dump**

Content: A 16-page three-color catalog illustrates the Euclid model R-27 rear-dump hauler for heavy construction, mines, quarries and industrial operations. Cut-a-way views show all major components, and on-the-job pictures explain the operating advantages resulting from new engineering design. Also included are complete specifications. Ask for form 130.

Where to get: Euclid dealers or Euclid Div., Department EE, General Motors Corp., Cleveland 17, Ohio.

Subject: **Wire Rope**

Content: Macwhyte's *Blue Book* has a finger-tip index that pops open 190 pages of information. The pocket-sized booklet answers questions like these. What is 6 x 19 classification? Why and how Lang Lay is different

from Regular Lay? What is peening, rated capacity, metallic core and cable laid rope? It also lists information on inspection, correct spooling, constructions, sheave maintenance, multiple-rope reevings, swaged fittings and use and abuse of wire rope. The literature is free to wire rope users. Ask for booklet G-16.

Where to get: Macwhyte distributors or Macwhyte Wire Rope Co., Department EE, Kenosha, Wis.

Do you suppose the laundry could have mixed up our coveralls?

New Movie . . .

Subject: **Glen Canyon Dam**

Content: *Taming a New Frontier*—a 16-mm. sound-color movie of the building of Glen Canyon Dam in northern Arizona—recently was released by International Harvester. Running 27 minutes, the film details start of construction in 1956 and the progress recorded up to the present. It was produced through the cooperation of the U. S. Department of the Merritt-Chapman & Scott Corp., Interior's Bureau of Reclamation and prime contractor of the $108 million project. Wilbur A. Dexheimer, commissioner, Bureau of Reclamation, termed the film "a huge success," adding that his organization looked forward to additional footage of this type. International Harvester plans to document the further progress of the job until it is completed in 1964. Chet Huntley, television network commentator, narrates the story.

Where to get: International Harvester Co., Department EE, 180 N. Michigan Ave., Chicago 1, Ill.

Notes from the Manufacturers

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Street-Robbins-Morrow, Ltd., Calgary, Wetaskiwin and Lethbridge, Alta., as its distributor in Alberta. Street-Robbins-Morrow will offer sales and service of ⅜ to 4-yd. convertible excavators and cranes; 10, 15, 25 and 45-ton Transit Machines; 5 and 12-ton all-hydraulic Hydrocranes and ⅜ and ½-yd. Hydrohoes and Hydroshovels; dragline buckets; 2½ to 8-yd. electric shovels; walking draglines with diesel or electric power; cable tool and rotary blast hole drills; bit dressers; and railway cranes. Six excavator models handled by the new distributor are produced at the Guelph (Ont.) plant of Bucyrus-Erie Co. of Canada, Ltd., a Bucyrus-Erie subsidiary. These models are the 11-B, 22-B and 30-B Transit Machines and the 22-B, 30-B and 38-B crawler-excavators.

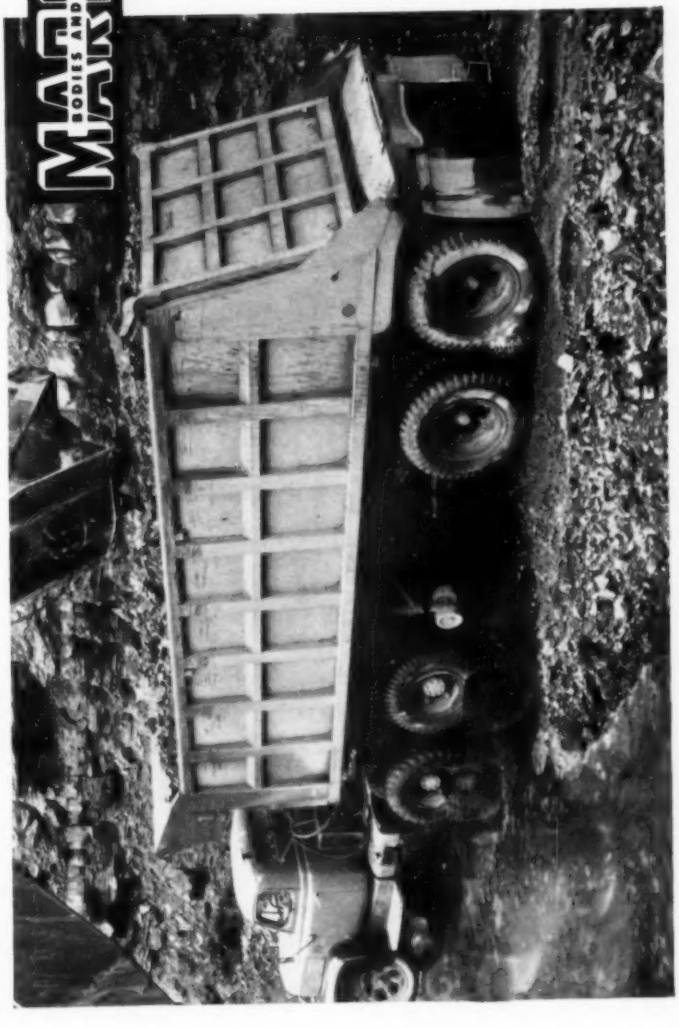
Macwhyte Co., Kenosha, Wis., recently opened a new warehouse building at 144 Thalia St., New Orleans 13, La., housing a complete factory stock of wire rope. The warehouse will serve industrial, construction and oil well drilling markets.

Marion Power Shovel Co., Marion, Ohio, has formed two new sales districts. Heading the new western Pennsylvania-western New York state territory is Joseph E. Fodor, who was promoted to district manager with headquarters in Pittsburgh, Pa. The area formerly operated as a part of Marion's eastern district with offices in New York City. The new Rocky Mountain territory formerly part of the company's western sales district, now includes the states of Utah and Arizona and parts of Nevada, Wyoming, New Mexico and Idaho. E. R. Johnsen is district manager, with headquarters at Phoenix Ariz. Robert Falck is western area sales manager, with offices in San Francisco, Calif.

NEWS ABOUT THE COAL HAULING BUSINESS

Marion Trailer Dumps Provide *Triple Pay-Off*
For Saxton Coal Corporation

MARION BODIES AND HOISTS



Here's how!

● **PAYLOAD BONUS...** This Indiana company put nine bigger (30 cu. yd.), lighter weight (with USS Cor-Ten steel) trailer dumps into operation, replacing nine 12-ton units . . . and hauling the same daily tonnage (2,000) of coal twice as far (from mine to tipple the distance is now 6 miles) at no increase in cost per ton mile.

● **PERFORMANCE BONUS...** These units have been in operation for two years, each making 9-10 round trips daily with an unusually small amount of downtime. (Marions are built to take it "under a shovel and under all hauling conditions.") A total of 7 other units of the same type have also been purchased for Saxton's operation. Big, rugged and fast front end telescopic hoists (model F-815-T-204) raise the bodies.

● **MAINTENANCE BONUS...** Marion engineering and manufacturing plus high strength steel provide long, maintenance-free life. Cor-Ten steel is highly resistant to atmospheric corrosion and has greater impact and fatigue strength.

Why not get complete information on Marion bodies and hoists. They're on-the-job designed with your profit in mind.

MARION METAL PRODUCTS CO.
Marion, Ohio

TO ADVERTISE: All advertising in this section is payable in advance. Rate: $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

HEAVY EXCAVATION EQUIPMENT

Shovels—Cranes—Drills—Trucks

15-W Bucyrus-Erie Elec. Drag, 215', 13 yd.
9-W Bucyrus-Erie Elec. Drag, 160', 11½ yd.
7400 Marion Diesel Drag, 175', 13 yd.
7400 Marion Elec. Drag, 175', 12 yd.
625 Page Diesel Drag, 160', 9 yd.
360-M Marion Elec. Drag, 175', 8 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W Bucyrus-Erie Diesel Drag, 125', 6 yd.
5-W Bucyrus-Erie Diesel Drag, 100', 6 yd.
2400 Lima Dragline, 130', 5 yd.
4500 Manitowoc Drag, 120', 5 yd.
120-B Bucyrus-Erie Elec. Drag, 115', 5 yd.
3900, 3500 and 3000 Manitowoc Cranes
111-M Marion Drag, 100', 4 yd.
1601 Lima 4 yd. Shovel/Drag
1055 P&H Drag, 80', 3½ yd.
1201 Lima Dragline, 85', 3 yd.
54-B Bucyrus-Erie Drag, 80', 2½ yd.
5360 Marion 26 yard Elec. Shovel
750-B Bucyrus-Erie 20 yd. Elec. Shovel
1050-B Bucyrus-Erie 20 yd. Elec. Shovel
5480 Marion 18 yd. Elec. H. L. Shovel
151-M Marion 7 yd. Elec. Shovel
170-B Bucyrus-Erie 6½ yd. Elec. Shovel
4161 Marion 6 yd. Elec. Shovel
120-B Bucyrus-Erie 4 yd. Elec. Shovel
111-M Marion 4 yd. Standard Shovel
54-B Bucyrus-Erie 2½ yd. Standard Shovel
Large selection of smaller shovels and draglines available
Model T-750 Reich Truck-Mounted Rotary and Down-the-Hole Drill
Euclid Trucks—Rear and Bottom Dump
Truck Cranes, Dozers, Scrapers, Front End Loaders, Drills, Buckets, Attachments and other miscellaneous equipment available.

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

ONE LORAIN MODEL 820

Serial 16017 powered by Waukesha diesel model WAKD engine, serial #707400 with gas starting engine. This machine is equipped with 23' shovel boom, 18' dipper stick and 2 yard Amsco bucket. Crawler mounted with 15'6" length crawlers and 11'4" width 34" treads. Weight 114,500 pounds. This machine is eleven years old and was rebuilt in 1955. $12,000 was spent on machine itself and $2,400 on motor. Since rebuilding, this machine has been used for a standby and has been used only about 1,000 hours.
Price, F.O.B. Detroit, Mich. "As Is" $19,500

WOLVERINE TRACTOR & EQUIPMENT COMPANY
Box 4705 Redford Station
Detroit 19, Mich.
Phone: KEnwood 4-8400 Day
KEnwood 7-2046 Night

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Bucyrus-Erie, 71-B dragline (used 240 hours) 4½-cu. yd. new style bucket (B-E) Long wide crawlers, 42-in. treads, GMC Series 6-110 diesel engine, Clark Torcon torque converter, 70-ft. pendant suspended boom. Save, $15,000 or Rent.

CALL—WRITE—WIRE
J. P. WAITE, INC.
3304 W. Pierce St. Ev. 4-1900
Milwaukee 1, Wis.

Bucyrus-Erie 22-B combination crane, clamshell, dragline and backhoe. 1952 machine. Has standard track, Caterpillar D318 diesel engine, electric starter, very good condition.

Bucyrus-Erie 38-B combination clamshell and dragline. Has 70' boom, long-wide tracks, Caterpillar D326 engine with torque converter, pendant suspension, mast, 2-speed independent propel.

Bucyrus-Erie 51-B combination clamshell and backhoe. Has 80' boom, long, wide tracks, independent propel, Caterpillar D17000 diesel engine, Kohler light plant.

Two Caterpillar D8 tractors with 8R dozers and No. 29 cable controls. Both 15A series machines in excellent condition.

Two Allis-Chalmers HD-21 tractors with cable dozers and rear power control units. Both machines completely rebuilt and guaranteed.

Three Allis-Chalmers HD-16 tractors with cable dozers and rear power control units. All rebuilt and ready to go.

One International TD-24 tractor with cable dozer and rear power control unit. This unit is approximately 18 months old.

Blaw-Knox batch plant consisting of the following: Aggregate bin, automatic aggregate batcher, Hi cement bin, Lo cement bin, cement elevator, dual automatic cement batchers, electric bin signal, rack and pinion slide gates, bulk cement track unloading plant.

6—20'0" long tunnel sections, structural steel screen supports, channel frame feeder conveyors, lattice frame type conveyors, push button control electrical system.
Double deck horizontal vibratory screens complete with drive and electric motor.

Five Caterpillar No. 12 motor graders. Three are 70D series and two are 8T series. Complete with cab, scarifier and lights.

All of the above equipment is located in the Chicago area and is offered subject to prior sale.

D. D. KENNEDY, INC.
P.O. Box 177 Bellwood, Ill.
Chicago Phone—AUstin 7-4300

ESTATE LIQUIDATION

2—Lorain shovels, L-50 K
1—Cat Highlift, D4
1—Cat Dozer, D6
1—Buffalo-Springfield Roller
1—Thurman Scale, 30-Ton, 30 PT 349

Inquire:

WILLIAM B. OGDEN, III
Merchants National Bank & Trust Co.
216 S. Warren St. Syracuse, N. Y.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Lorain mdl. TL25, Serial #19697, ¾-yd. combination backhoe and shovel, Waukesha gas engine, standard crawlers, 22" treads. Completely reconditioned—$10,500.

Insley crawler-mounted backhoe, type "K," 24" bucket, standard crawlers, serial #6923, Waukesha gas engine, year 1955. Excellent value—$7,850.

Lorain mdl. L40, Serial #15639 combination shovel, backhoe, 50' crane boom with fairlead and rudomatic tagline. Fair condition—$5,000.

Insley mdl. "K," Serial #5021, ½-yd. backhoe with gas engine. Working condition—$4,500.

Bucyrus-Erie Hydrohoe attachment for H-3 Hydrocrane complete with 18" general purpose dipper and 20" utility dipper and all necessary fittings. Very good condition—$1,000.

CHAPMAN BINDER MACHINERY CO.
Brighton St. Union, N. J.
MUrdock 8-0060

1—51-B serial #62581 with D1700 2-yd. shovel and crane boom.
1—22-B serial #18844 gasoline engine, shovel, hoe and crane.
1—22-B Transit Machine on 1949 Dart Carrier, gasoline engine, crane, 30' boom.
1—Gradall, truck mounted, new in 1957, 24", 36" and 60" buckets available.
2—Michigan loader, model 175, 2½-yd., new in 1954, 1956.
1—Michigan loader, model 125A, 1¾-yd., new in 1955.
1—Caterpillar model D7, 22" tracks, serial 4T2203, crank case guard starter, La Plant-Choate blade, new undercarriage, rebuilt motor.
1—Caterpillar model D2, 12" tracks, serial 4U2456, crank case guard starter, La Plant-Choate blade.
1—Austin Western sweeper, model 40, new condition.
1—Semi trailer, 25-ton Roger type H-25 D-56.

JAMES O'CONNEL & SONS, INC.
99 E. 236th St. New York 70, N. Y.
Phone: FAirbanks 4-0989

SHOVEL ATTACHMENT

BUCYRUS-ERIE tunnel shovel attachment for 22-B consisting of 14' boom, 12'10" stick, 1-cu. yd. rock dipper, crowd drum, sprocket and crowd chain. Excellent condition. $3,500.

CRANES

Link-Belt Speeder Mod. LS90, 1-yd. capacity crane, 50' boom, two sheave boom-point, 24" pads, Cat D318 diesel engine. Reconditioned. $14,000.

LIMA 44T truck crane, 25-ton combination clamshell and lifting crane, 80' boom, 30' jib, Rudomatic tagline, Dart carrier, 9' wide, Waukesha engines. Very good condition. 30-day guarantee. $30,000.

SCRAPERS

CATERPILLAR mod. DW21 tractor with Cat No. 21 scraper. Certified Buy. 2 units,—each $25,500.

LETOURNEAU Mod. LS, 4-wheel scraper. (11-yd. cap.) Good condition. $4,500.

TRACTOR

CATERPILLAR D8 diesel tractor with oil clutch, 24" tracks, pull hook, canopy top and Cat 8S cable blade with Cat No. 25 D.D.P.C.U. Recent 13A series. Bonded Buy. $22,500.

TRENCHER

CLEVELAND No. 95 trencher, option 5, 16" buckets, 21½" cut, powered by Continental gasoline engine. Rebuilt. Good value. $6,600.

Subject to inspection & prior sale.

H. O. PENN MACHINERY CO., INC.
140th St. & East River CYpress 2-4800
New York 54, N. Y.

SMALL SHOVELS, CRANES, DRAGLINES — UP to 2½ YDS.

1—Michigan C-16—¼-yd. backhoe, ½-yd. 22" bucket, 9'9" crawlers, 20" wide, Hercules gas engine JXD #1742230, machine #3797, 4 years old.
1—Koehring 303—¾-yd. backhoe, 30" bucket, 10'6" crawlers, 24" wide, Waukesha gas engine #484150, 4⅝"x5¼", serial #2337.
1—Worthington 16-S concrete mixer on 4 pneumatic tires with power skip and water tank, serial #5548, powered by Wisconsin VF-4 gas engine, 4 years old.
1—Osgood 200—½-yd. backhoe with 22" bucket, 11' crawlers, 22" wide, powered by Continental gas engine, Machine #6285, 5 years old.
1—International TD-14 crawler loader model 14K3 with Drott skid-shovel, 2½-yd., serial #B-2463, only 1½ years old, excellent shape, 1500 hours.
1—Bucyrus-Erie 15-B hoe attachment with ½-yd. bucket, 34" wide with side cutter straight boom like new.
1—Bucyrus-Erie 15-B ½-yd. shovel attachment, perfect.
1—Wiley PM215 Patchmobile portable asphalt patching unit on 2 pneumatic tires, complete with rotary dryer. This unit is new.
1—Ruhr M 1½-yd. heavy-duty grapple, new, excellent buy.
1—Wayne 36" rider industrial vacuum pick-up power sweeper, demonstrator, 2 years old.
1—LeRoi 315 air compressor on 4 pneumatic tires, 7 or 8 years old.
2—CMC Jetcretes with all accessories. Excellent condition, practically like new with all extra equipment.
1—Baker 3,300 gallon bulk tank trailer, single axle.
1—Automatic TN4636 platform Transporter, 20" wide, 36" long.
1—Ross 6-ton pneumatic tired fork lift truck, 10' mast, 14' lift.
125—Ironbound wood skids 49"x 27"x 7".
1—Bucyrus-Erie 15-B positive crowd shovel, 15'-6" boom, 12'-6" handle, ½-yd. cast iron dipper including dragline and clamshell equipment consisting of 30' boom, complete dragline equipment, also tagline equipment with rope, closing and lowering ropes, drum lagging, no clamshell bucket or drag bucket included. Fully enclosed steel cab, independent power boom hoist, 20" wide treads. Buda 6-cylinder 3⅛x4⅜ HP-326 gasoline engine with electric starter, 2900# cast iron ballast, serial #51572.
1—Used Kennedy Van-Saun Revolving Scrubber Washer Screen, 48" diameter x 21' 0" long, in excellent shape and complete with all new parts including extra scrubber sections and new sizing screens.

S. M. CHRISTHILF & SON, INC.
Timonium Road and Harrisburg Expressway
Timonium, Md.

H-3 Hydrocrane S.N. 81139 mounted on 1950 Chev. truck model 6103. Includes 12' boom insert and 10' jib. Price: $4,000 F.O.B. St. Louis, Mo.

EUCLID SALES & SERVICE, INC.
Attn: F. M. Shelden
5231 Manchester Ave. St. Louis 10, Mo.

Unit 45 tagline reel complete with fittings, hose and guard for H-3 Hydrocrane. Good cond. Price: F.O.B. Minneapolis, Minn., $150.

THE ZECO CO.
2929 University Ave., S. E.
Minneapolis 14, Minn.

Bucyrus-Erie model 11-B Transit Crane with 35' folding type boom for clamshell, screw jack outriggers. Rented only two months—like new condition. For rent or sale with Backhoe. S/N 119441 $16,500 F.O.B. Evansville, Ind.
Lorain model L50J, 1-yd. crane, clamshell, dragline combination, 70' boom pendent suspension. S/N 22159 $14,000 F.O.B. Elizabethtown, Ky.
Link-Belt model LS-90 with shovel front attachment, powered by GM model 4-71 diesel engine. S/N 7AN-1569 $10,500 F.O.B. Elizabethtown, Ky.
Insley model K12, ½-yd. shovel, dragline with 40' boom and Buda model HP-326 gasoline engine. S/N 3446 $5,500 F.O.B. Evansville, Ind.
Lorain model L41, ¾-yd. crane, dragline, clamshell with 40' boom, tagline and fairleads, pendent suspension. Powered by Caterpillar model D318 diesel engine. S/N 19253 $8,900 F.O.B. Louisville, Ky.

Write—Wire or Phone Jim Waddell

BRANDEIS MACHINERY & SUPPLY CO.
P. O. Box 1705 MElrose 7-4741
Louisville 1, Ky.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

1—705 P&H Dragline, 2-yd. w/55' boom.
1—Northwest model 25 crane with 45' boom.
1—Model H Scoopmobile, hydraulic loader, ¾-yd. 1955 model, excellent condition.
1—12-ton single axle trailer (7:50 x 20 tires, new) air brakes new.
1—Model C Scoopmobile 22' tower, pallet fork or bucket, excellent condition.
1—Model BB120 Wooldridge scraper, 14 to 18-yd., good.
1—Model 41 Lorain ¾-yd. shovel with Cat D4600 engine, 1945 model, needs some repair.
2—365 Gardner-Denver compressors—Good.
1—Model 10-20 Unit crane mounted on Dart truck, excellent.
1—1½-yd. Kiesler clamshell-rehandling.
1—HD-20 Allis-Chalmers with "Cat" 25 DDPCU.
1—Model 300 International utility tractor with Wain-Roy Backhoe, 1956 model, excellent.
1—Model 12 Caterpillar motor patrol. Fair condition.
1—YR-13 LeTourneau scraper—working condition.
1—Esco ¾-yd. orange-peel bucket—excellent.
1—K-12 Insley dragline—good. Located Springfield, Mo.
1—LD-7 Scoopmobile, 1⅞-yd. bucket, excellent.

CONTRACTORS SUPPLY
620 East 18th St. Kansas City, Mo.

New sprag for H-3 Hydrocrane removed from Hydrohoe #93098. Price: F.O.B. Cleveland, Ohio, $50.

Mr. R. W. Casey
THE W. T. WALSH EQUIP. CO.
Cleveland 11, Ohio

H-EQ-1 Hydrohoe; 18" wrist action type bucket, mechanical ejector—less hoist rams; sidecutters to cut 24"; HD 3¼" digging ram. New. Removed from H-3 #111124 in 1954. Price $2,100 F.O.B. Buffalo, N.Y.

Write: DOW & CO., INC.
Attn: H. E. Wildhack, Sales Mgr.
Buffalo, N. Y.

⅜-yd. model 10-B Bucyrus-Erie shovel (1949), Hercules gas engine. Good working condition. Available immediately. $5,000 our yard, Milwaukee, Wis.
⅜-yd. model H-3 Bucyrus-Erie Hydrocrane (1950) mounted on IHC A-162 truck chassis equipped with tagline reel, clam bucket. Very good buy.
⅜-yd. model H-3 Bucyrus-Erie Hydrocrane (1952) mounted on Ford F-600 truck chassis, equipped with steel operator's cab, tagline reel, clamshell bucket. Very good condition.
10-ton model 11-B Bucyrus-Erie truck crane demonstrator and rental unit, 70' boom, jib, 6x6 carrier.
¾-yd. model 1020 Unit shovel equipped with GMC diesel engine. Good working condition. Priced to sell.
1-yd. model LS-90 Link-Belt shovel new 1953, Waukesha gas power. Excellent condition. To close out at $12,500, our yard.
1-yd. model 455 P & H crawler crane-clam-dragline with 75' boom, 15' jib, Chrysler 8-cyl. gas engine. Machine in excellent condition. F.O.B. Milwaukee.
1¼-yd model 33-B Bucyrus-Erie crane-clam-dragline machine, 70' boom, independent boom hoist, gas power. Very good condition. A lot of machinery for $15,000, our yard.
1½-yd model 604 Lima crane-dragline machine new 1951, Cummins diesel engine, 80' boom & fairlead. Was overhauled last winter. Very good condition.
2-yd. model 820 Lorain crane-clam-dragline machine, Cat D13000 diesel engine, swamp cats, 90-ft. flange type boom, fairlead, pressure lubrication system. In excellent condition. Rented, available in 30 days.
⅜-yd. model H-3 Bucyrus-Erie Hydrocrane (1953) mounted on 1953 Ford F-600 truck chassis, complete with 2-piece telescopic boom, tandem outriggers, operator's cab with heater, tagline reel, hydraulic clamshell bucket. Overhauled and repainted. In excellent condition.
¾-yd. model 375 American crawler shovel (new 1949)—with Waukesha gas power. Priced at $3,750.
¾-yd. model 22-B Bucyrus-Erie crawler clam-dragline, equipped with Buda K-428 gas engine, 12'-3" long crawlers, 70' boom, fairlead, tagline reel, in good condition. $12,500, our yard.
¾-yd. model 375 American crawler-mounted dragline, long crawlers, fairlead, Series 3-71 GMC diesel engine.
¾-yd. model "M" Insley dragshovel (new 1955), equipped with long wide crawlers, Cat D315 diesel engine. Good condition. $9,750, our yard.

J. P. WAITE COMPANY
P. O. Box 313 3404 W. Pierce St.
Milwaukee 1, Wis.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

CLEARANCE SALE OF ALL USED EQUIPMENT

PRICES HAVE BEEN REDUCED
5% to 30%

AUSTIN WESTERN BADGER shovel and backhoe, S/N 3386, powered by IHC UD-9 diesel engine. In fairly good operating condition. U-116 $3,650.
BUCYRUS-ERIE model 22-B ¾-yd. hoe, S/N 45148, powered by UD-14 IHC diesel engine. Has been repaired and in good condition. Can furnish as a crowd shovel at same price. U-179 $12,900.
BUCYRUS-ERIE crowd shovel attachment for model 15-B, ½-yd. excavator. Very good condition. U-40 $1,700.
BUCYRUS-ERIE crowd shovel attachment for model 15-B, ½-yd. excavator. Fair condition. U-167 $800.
BUCYRUS-ERIE backhoe attachment for model 15-B, ½-yd. Excellent condition. U-52 $2,000.
BUCYRUS-ERIE dragline boom for 15-B, two 15-ft. sections. Good condition. U-51 $1,050.
DRAGLINE bucket for Bucyrus-Erie 15-B, ½-yd. capacity. Good condition. U-142 $300.
HANSEN Model 31 shovel, backhoe, and dragline, S/N 2120, IHC UD-6 diesel engine. Condition is fair to poor. U-32 $3,300.
NORTHWEST model 25, ¾-yd. shovel, dragline and hoe. 40' crane boom and cambered type hoe boom, 30" track shoes. S/N 16806. This late 1955 machine is in excellent condition and guaranteed. U-130 $18,200.
NORTHWEST crowd shovel attachment for model 25, ¾-yd. New and unused. U-198 $1,950.
UNIT model 10-20 backhoe, includes crowd shovel, dragline, dragline bucket and clamshell bucket. S/N 1719. Good condition. U-249 $7,950 F.O.B. Idaho Falls, Idaho.
LINK-BELT Speeder model LS-52 with two front ends—25' dragline and crane boom and crowd shovel. Powered by Cat D315 diesel. Very good condition. U-276 $11,300.
WELLMAN 2½-yd. dragline bucket, Model DXL, S/N D1789. Has never been used. $1,200.

Call, wire, or write today for information about these and our many other items of used equipment.

LANG CONSTRUCTION EQUIPMENT CO.
P. O. Box 1646 Salt Lake City 10, Utah
Phone: DAvis 2-1241 TWX No. SU-278

MISCELLANEOUS EQUIPMENT

1—Reconditioned—3½-cu. yd. type "BM" medium duty, perforated dragline bucket complete with all fittings. Weight—5,500 pounds. Special reduced price—$2,730. F.O.B. Evansville, Ind.
1—Reconditioned—3½-cu. yd. type "BM" medium duty, solid type dragline bucket complete with all fittings. Weight—5,600 pounds. Special reduced price—$2,730. F.O.B. Evansville, Ind.
1—New—3-cu. yd. SPECIAL type "BM" medium duty dragline bucket with heavier than standard side and bottom plates, complete with all fittings. Weight—5,000 pounds. Reduced price—$2,820. F.O.B. Evansville, Ind.

BUCYRUS-ERIE
South Milwaukee, Wis.

37-B shovel front available immediately, cheap.

SIMMONS CONCRETE CORP.
P. O. Box 266
Fallsington, Pa.

For Sale

3—Caterpillar DW15's tractor & scrapers S/N 45C348, 45C-369, 45C-379. Excellent operating condition, 21.00 x 25 rubber—Excellent to Good.

EUCLID SALES & SERVICE, INC.
5231 Manchester Ave. St. Louis, Mo.
Phone: MIssion 5-3417

MISCELLANEOUS EQUIPMENT

Caterpillar model D8 diesel tractor, serial 2U-18684, equipped with Caterpillar Model 8-A angle blade bulldozer, Caterpillar Model 25 rear mounted double drum cable control unit, electric starting for gasoline starting system, crankcase guard. This tractor is in excellent condition. $18,000.

Caterpillar model D8 diesel tractor, serial 14A-1633, equipped with Caterpillar model 8U Universal bulldozer, Caterpillar model 29 rear mounted double drum cable control unit, 5H-2576 transmission group, 22" grouser tracks, electric starting, track roller guards, crankcase guard, lights, dry type air cleaner. Good condition. $19,500.

Caterpillar model D7 diesel tractor, serial 3T-7402, equipped with LeTourneau angle blade bulldozer, Gar Wood model CCU-2 rear mounted double drum cable control unit, serial No. 22766, roller guards, large front idlers, seven roller track frame. Good condition. $8,500.

Caterpillar model D7 diesel tractor, serial 3T-16033, equipped with Caterpillar model 7A angle blade bulldozer, Caterpillar model 24 front mounted single drum cable control, 20" grouser tracks, electric starting, track roller guards, dry type air cleaner. This machine is in good condition. $15,500.

Caterpillar model D6 74" diesel tractor, serial 9U-1227, equipped with 19-S model Caterpillar 46 front mounted Hydraulic control, NEW Caterpillar model 6-A hydraulic controlled angle blade bulldozer, electric starting, crankcase guard, 20" grouser tracks. Good condition. $12,750.

Caterpillar model D6 60" diesel tractor, serial 8U-9277 equipped with Caterpillar model 6-S Hydraulic controlled bulldozer, Caterpillar model 46 front mounted hydraulic control, Hyster D6N worm drive towing winch, with operator guard, crankcase guard, lights, electric starting, oil type flywheel clutch. Machine in good condition. $15,500.

Allis-Chalmers model HD-20 diesel tractor, serial HD20H-3461 equipped with torque converter, crankcase guard, roller guards, electric starting, push plate, powered by GM model 6B-1641 diesel engine, serial 62601RA. This tractor has a Caterpillar model 25 rear mounted double drum cable control, serial unknown. Tractor in fair condition. $7,250.

Allis-Chalmers model HD-21A torque convertor, diesel tractor, serial No. HD-21A-8528, equipped with Gar Wood model 281 rear mounted double drum cable control unit, Gar Wood straight blade bulldozer, roller guards, crankcase guard, lights, 26" grouser tracks. Good condition. $17,500.

Caterpillar model D6, 74" diesel tractor, serial 9U-371, equipped with 6-roller non-oscillating track frame, large front idlers, 16" wide grouser tracks, Caterpillar model 46 front mounted hydraulic control unit, Trackson model AF-6 hydraulic angling blade bulldozer, Trackson model M-6 pipelayer, complete with 14' boom and snatch block. Very good condition. $12,500.

International model TD-14 74" diesel tractor, serial No. TDF-21658T2, equipped with 20" grouser tracks, Cardwell hydraulic angle blade bulldozer, Cardwell model PBI-14 pipelayer, hydraulic system repaired, pipelayer completely checked. Fair condition. $5,500.

International model TD-14 diesel tractor, serial No. TDF-20852T2, equipped with Cardwell model PBI pipelayer, serial No. PBI-14-294 with counterweight, less boom. 20" grouser tracks, crankcase guard. Machine in fair condition. $3,700.

Bucyrus-Erie model 10-B shovel hoe combination, serial No. 72711, powered by Buda model 6B-273 gasoline engine, with electric starter, mounted on 14" flat pads, equipped with 13'0" shovel boom 11'0" handle, ¾-yd. dipper bucket, 15' straight boom backhoe attachment, ¾-yd. dragshovel bucket. Fair condition. $4,250.

Cedarapids model 4A-GR 2540 portable primary crusher, serial 12934, complete with 42 x 10 heavy duty apron feeder, 48" x 4' double deck vibrating grizzly, 36" x 30' undercrusher conveyor, mounted on steel truck frame with tandem oscillating axle with 10-00 x 20 tires, with air brakes with kingpin, equipped with and powered by Caterpillar model D13000 diesel engine, serial 4S-6604. This plant is in good condition. $37,500.

Cedarapids model CR 48" x 10' triple deck horizontal vibrating screen, serial 18950, complete with ¾" screen on top deck, ½" cloth on middle deck, and #4 feed end and ¾" delivery end on bottom deck, with V-Belt drive sheaves for 1,800-rpm electric motor. Good condition. $3,700.

R. L. HARRISON CO., INC.
1801 4th Street, N. W.
Albuquerque, N. M.

MISCELLANEOUS EQUIPMENT

COMPRESSORS AND AIR TOOLS

2—Joy Crawler Drills, drill class CTM1. These two drills are mates, both have had only one season's use. There is a good stock of extra parts with these drills.

2—Gardner Denver Wagon Drills, each have drifter part D99D. Both have 10-ft. masts for 8-ft. steel. Mounted on pneumatic tires. Located at Casper, Wyo., branch.

1—Chicago Pneumatic 365 RD2 portable, 4 pneumatic tires—machine in very good condition.

1—Ingersoll-Rand DR-315, portable mounted on 4 pneumatic tires—machine like new. Located at Casper, Wyo., branch.

EXCAVATORS

1—Lima 604, 1½-yd. shovel, powered by Cummins H1S diesel engine. This machine in good operating condition and priced for a quick sale. Located at Casper branch.

1—Bucyrus-Erie 51-B combination dragline and lifting crane, powered by NHRS-600 diesel. Torcon converter, 100' boom, mast and pendant suspension—less than 1,600 hours on machine. If you are in need of this size machine you will certainly appreciate the care this machine has had.

1—Model L Quickway, equipped as a backhoe, mounted on 1944 Federal truck.

1—P&H Crane mounted on 12-wheel Maxi-carrier, powered by Waukesha gas engine, 60' boom. This machine is ideal for industrial application.

1—Osgood dragline model 200, powered by GM 3-71, equipped as a dragline—rage dragline bucket included. F.O.B. Denver, Colo. $3,850.

ASPHALT EQUIPMENT

1—848 Barber Greene asphalt plant, equipped with feeder, bucket elevators, rotary drier, gradation unit, dust collector, pug mill, Cleaver Brooks steam boiler, GM model 4-71 engine, Caterpillar model D13000 engines, also electric motors, wiring cables and panels that make this plant complete. We welcome inspections of this plant.

TRACTORS

1—HD-11G Allis-Chalmers front-end loader, model TS-11 Tracto-Shovel 2-yd. front-end loader and model 9800 ripper. This machine shows good care. Located at Casper branch.

1—International TD24, equipped with double drum power control unit and straight dozer. This tractor was new in 1955—We have made necessary repairs. Priced to sell.

THE COLORADO BUILDERS' SUPPLY CO.
1534 Blake St.
Denver 2, Colo.

1951 Mack Tractor, 40T series, 20,000 miles
1946 Lowboy Trailer 2 axle, 8 tires
Jaeger 3 sack mixer mounted on rubber

GEO SENNE & CO.
Box 1309
Topeka, Kan.

41—New—¾ cu. yd. type "BM" medium duty dragline buckets complete with all fittings. Weight—1,900 pounds each. Reduced price—$1,170 each. F.O.B. Evansville, Ind.

BUCYRUS-ERIE
South Milwaukee, Wis.

MISCELLANEOUS EQUIPMENT

Adnun blacktop paver, S/N 1462. Has been repaired and is in good operating condition. U-5 $1,400.

Barber-Greene model 879-A finisher. Lays 8' to 12' strip. Powered by LeRoi gas engine. Very good condition. U-244 $5,800.

Barber-Greene model 879-A asphalt finisher. S/N 49-67. Powered by LeRoi gas engine. Has been completely rebuilt and is in excellent condition. U-170 $9,200.

Carco model "J" logging winch, 1955 model, good as new. U-65 Only $2,100.

Cleveland wheel ditcher, "Baby Digger". S/N 306. Powered by Hercules gas engine. Has 4½-ft. digging depth. Good working condition. U-1 $1,450.

Bege ST-770 hydraulic scraper, 6-yd. struck capacity. Excellent condition. U-246 $3,200.

Gardner-Denver Air Trac model AT complete with DH-123J deep hole drill with 1½" lock-in chuck. Includes two RMC 12' chain feed for 12' sectional drill rods. Only 3 months use. U-346 $9,500.

Joy Heavy Weight Class 58-BH 7⅝" blast hole drill, 1951 model. Bargain price. Inquire for further details.

International Payscraper model 2T-75. Has 55,000 lbs. capacity and wide base tires. Excellent condition. U-274 $31,250.

Campbell cab for Hough HO Payloader. Like new $150.

Bucyrus-Erie cab for IH TD-9 tractor. Excellent condition. U-76 $100.

Campbell cab for Cat D4. Excellent condition. U-77 $125.

Bucyrus-Erie model CR-3 tractor-drawn cable operated ripper, excellent condition. F.O.B. Idaho Falls, Idaho. U-250 $1,050.

LeTourneau model K-30 tractor drawn cable operated ripper. Good condition. U-31 $1,100.

Superior pipe tongs as good as new. U-176 $99.50.

Yale electric crane, model K-42-SH-6-7-78U, 6000# capacity, 12' to 18' telescopic revolving boom and hard rubber tires. It has never been used. Govt. surplus unit sells new from factory for approximately $17,900. Our price less batteries and battery charger is only $2,950.

Call, wire or write today for information about these and our many other items of used equipment.

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"With our crushed stone and lime loading specifications running in excess of 1,000 tons per day," asserted Mr. Walter Van Gorden, treasurer-manager, Cave Stone Company, Cave Indiana, "our requirements on loading equipment are as critical as on any of our manufacturing units. All of the efficiency and production engineered into our excavation and processing equipment is of little value if we cannot maintain like values on the delivery end.

"Because of this, we investigated every available loader on the market before buying our TL-20 TRACTOLOADER* in September, 1957. This decision was made on the basis of actual tests with each piece of equipment which indicated that the TL-20 consistently operated faster, reached farther, lifted higher and gave us more pounds per bucket than anything else in its class. *We would have had to spend $2,000 to $3,000 more for a machine which would equal its production potential.*

"Our two primary requirements for a loader are height and reach. If bucket capacity were our only concern, we could have approached the load of our present unit by simply buying a larger machine of the same make as our previous one. The TL-20 was the only one available in this price class with a two-yard capacity, but, *more important, was the height of the lift and the length of the reach.* With competitive machines, we would have to load the 8 to 14-ton trucks from both sides to get maximum load and balance. The TL-20, on the other hand, has a dumping height of 9 ft with a reach of 34 in. at this height. This increase means that we can easily load from one side without damaging the truck or holding up the driver over 4 minutes.

"Now, with this one machine, we are handling 80% of our loading, and have not yet extended it to its limits. We have yet to become involved with any type of maintenance other than the normal routine upkeep required on any piece of mechanical equipment. In spite of the rugged nature of the application, we expect a minimum of 5 years' service from the unit, and in all probability will replace it with an identical loader."

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